3.2.6 Deficiency/Discrepancy Resolution

3.2.6.1 Notification

If the Inspector's visual observations indicate that the material will not meet the specifications, he shall immediately so inform the Client's Representative and note this action on the Daily Field Report. The exact location of in-place questionable material shall be accurately documented for future reference. The actual "PASS-OR-FAIL" depends on the results of the laboratory tests. If a sample fails, the Senior Technician shall immediately inform the Project Engineer, the Inspector and the Client's Representative by telephone, confirming with a memo as soon as practicable.

3.2.6.2 Retest Procedure

In the event of failure, the Inspector shall resample at 3 locations within a 10 foot radius, composite the samples, and submit the composite sample to the laboratory marked for special expedited handling. The persons listed in Section 3.2.6.1 shall be notified using the specified procedures. At this point, the Project Engineer will specify a more comprehensive investigation if warranted in his opinion.

3.3 Lift Control/Total Thickness Control

3.3.1 Frequency of Testing

3.3.1.1 Individual Uncompacted Lifts - General Fill Material

The Inspector shall verify the uncompacted lift thickness at a rate of at least one such determination per 5000 square feet of general fill material placed, but also not less than once per lift.

3.3.1.2 Clod Control. Clod size control and inspection for roots, sticks, and other extraneous matter shall be continuous during material placement.

3.3.1.3 Total General Fill Thickness

General fill thickness varies. The general cut and fill elevation survey (ref. Section 2.3.3) will be used to verify that required grades and slopes have been obtained.

3.3.2 Procedures

3.3.2.1 Lift Thickness

The Inspector shall make a shovel hole through the uncompacted material, but shall not damage any underlying lift. The depth shall be measured to the nearest 0.5 inch; this measurement shall be made from the bottom of a 2 x 4 wood beam placed across the top of the hole. Upon completion of the measurement, the hole shall be refilled.

3.3.2.2 Clod Control

The Inspector shall maintain continuous visual inspection for clod size, presence of roots, sticks, or other extraneous matter.

3.3.2.3 Inspector's Immediate Action

If the measured lift thickness does not exceed 120% of the specified value, the area shall be considered as "PASS". Otherwise, the Inspector shall immediately retest at three locations within 10 feet of the original test. If the average of the three tests is a "PASS", the area shall be considered as "PASS", and no further action is necessary. Otherwise, the procedure of Section 3.3.6 apply.

3.3.2.4 Total General Fill Thickness

The Inspector shall compare the general cut and fill elevation survey results with construction plan elevations and contours.

3.3.3 Equipment and Calibration

3.3.3.1 Equipment

The necessary equipment for this work consists of:

A. Sharpshooter Shovel
B. Metal Yardstick or Tape
C. Wood 2 x 4 Beam
D. Hand-type Auger meeting ASTM 1452

3.3.4 Field Documentation

3.3.4.1 Test Locations

The locations where the lift thicknesses and total cap thicknesses were determined shall be numbered sequentially and marked on separate location maps. The maps shall be referenced to the Inspector's Daily Field Report by date and report number.

3.3.4.2 Clod Control

The Inspector shall mark on the location map of Section 3.3.4.1 the areas approved for clod size and freedom from sticks, roots, or other extraneous matter.

3.3.4.3 Data Sheet

The required data includes:

A. Data
B. Inspector
C. Location
D. Lift Number
E. Table of Test Numbers and Measured Depths

The data sheet shall be referenced to the Inspector's Daily Field Report by date and report number.

3.3.5 Reporting

3.3.5.1 Internal

The Inspector's Daily Field Report shall document that thickness determination were performed, and shall include a map showing the numbers and locations of the tests.

3.3.6 Deficiency/Discrepancy Resolution

3.3.6.1 Notification

If the measurements indicate that the lift thicknesses, clod control, etc., do not meet the specifications, the Inspector shall immediately so inform the Client's Representative, and note this action on the Daily Field Report. If the area is immediately brought into compliance, this shall also be noted on the Daily Field

Report and no further action is necessary. Otherwise, the procedures outlined in Section 3.3.6.3 applv. In the case of the total general fill thickness determination, compliance will not be assured until the general cut and fill elevation survev is complete. Upon checking the survey results, notify the client's representative of compliance or any area of discrepancy by telephone immediately, and confirm by memo as soon as practicable.

3.3.6.2 Retest Procedure

A. Lift Thickness

Prior to accepting any reworked area, the Inspector shall retest it by checking depth at 3 locations within a 20 foot radius.

B. Clod Size/Roots

The Inspector shall perform a thorough visual inspection of failed areas prior to acceptance.

C. Total General Fill Thickness

If there are deficiencies in total general fill thickness, the entire area bounded by points which did not comply will be considered as failed. If the deficiency is 6 inches or less, addition of one lift (loose thickness 6 inches minimum) over this area will be adequate. Otherwise, that area must be re-surveyed for thickness verification prior to acceptance.

3.3.6.3 Tracking Failed Areas

Until the failed area is brought into compliance, the Inspector shall record on each Daily Field Report that this has not yet been accomplished. A specific notation shall be made on the Daily Field Report when the area has been made acceptable and so proven by depth checking.

3.4 Field Density Testing (For General Fill Material)

3.4.1 Frequency of Testing

3.4.1.1 Grid Size - General Fill Material

The basic test pattern shall be a grid covering the lift or portion of lift worked that day. The grid shall be about 50 x 50 feet, so that the rate of testing is not less than 1 test per 2,500 square feet.

3.4.1.2 Grid Shift - General Fill Material

The location of the grid shall be shifted between lifts so that a test on one lift is near the center of a grid space on the previous lift.

3.4.1.3 Other Cases - General Fill

In no case shall material be untested. No matter how small an area is worked on a given day, there shall be no fewer than three (3) tests per day. In addition, the Inspector shall test any locations not on the grid which appear questionable upon visual examination.

3.4.1.4 Other Testing - General Fill

Permeability samples shall be obtained at 10% of the field density test locations, chosen on a random basis (Section 3.5.1). Classification test samples (Section 3.2.1.1) are also taken at some field density test locations. On occasion, Check Proctor samples (Section 3.2.1.2) must also be taken.

3.4.2 Procedures

3.4.2.1 Nuclear Probe Test

This test shall be conducted in accordance with ASTM *D2922 (Density) and D3017 (Moisture).* The Inspector shall record the field data.

Exxon BRPP safety procedures for the use of radiation type equipment shall be approved in accordance with Corporate policies.

3.4.2.2 Drive Cylinder Method

This test shall be conducted in accordance with ASTM D2937. Moisture content shall be determined by ASTM D2216. The sample must be trimmed and weighed when the test is taken. The Inspector shall record the field data.

3.4.2.3 Backfilling

All holes made into compacted general fill material shall be backfilled with cement bentonite grout.

Virgin hydrated and tamped bentonite pellets may be used as an alternative to cement bentonite grout.

3.4.2.4 Inspector's Immediate Action

If a test does not receive a full "PASS" under the Field Check of Section 3.4.4.3, and

* The Degree of Compaction fails by not more than 2.0 percentage points, and

* The Moisture Content is above optimum,

then two more tests shall be performed within a 3 foot radius. If the average moisture content of the three tests yields a (P) and the average degree of compaction of the three tests yields a (P), then the combined "test" is considered a "PASS", and no further action is necessary. In any other case, the procedures of Section 3.4.6 shall apply.

3.4.3 Equipment and Calibration

All calibration required below shall be documented in writing by the technician performing the calibration, and the resulting document shall be furnished to the Senior Technician.

3.4.3.1 Nuclear Probe Test

A. Equipment

The following equipment is required:

Troxler Gauge Model 3400 or Equivalent
Calibration Block
Driving Template

Spike
Small Sledgehammer
Cement-Bentonite Grout

B. Calibration

The laboratory calibration given in Paragraphs 4.1 of ASTM D2922 and 7.1 of ASTM D3017 shall be performed annually. Checks using the Calibration Block shall be made at the beginning of each shift.

3.4.3.2 Drive Cylinder Method

A. Equipment

The following equipment is required:

Driving Hammer
Tubes
Sharpshooter Shovel
Heavy Knife
Straightedge
Triple-Beam Scale or Equivalent
Plastic Bags
Cement-Bentonite Grout
Indelible Marking Pen

B. Calibration

The cylinders shall be calibrated following Paragrapns 5.1.1 of ASTM D2937 before use and at monthly intervals thereafter. The weight shall be calibrated weekly. The scale shall be calibrated daily using the 5-pound weight.

3.4.4 Field Documentation

3.4.4.1 Test Location

All field density tests, no matter what method used, will be numbered sequentially. The Inspector shall record the location and test number on a separate location map for each day. The map shall be referenced to the Inspector's Daily Field Report both by date and by report number.

3.4.4.2 Data Sheets

The Test Data Sheet shall identify each test by location, lift number, test number, and Proctor Curve number. The results shall also be shown on the data sheet: moisture content, wet and dry densities, degree of compaction, and overall compliance ("PASS or FAIL").

3.4.4.3 Field Check

Compliance with the moisture specification shall be indicated with a (P) or (F) following the sample's moisture content. Compliance with the degree of compaction specification shall be indicated with a (P) or (F) following the sample's degree of compaction. Both must be (P) for the sample to receive a "PASS". The inspector shall also check the sample's theoretical degree of saturation by calculation using the moisture and density obtained from the nuclear test method. If the apparent value exceeds 102%, he shall retest in the same general location immediately.

3.4.5 Reporting

3.4.5.1 Internal

The Daily Field Report shall document the activities performed, including the test numbers, specific reference to any failed tests, location, lift and areas being tested. Accompanying the Daily Field Report will be the location map and the Test Results; both shall be referenced to the Daily Field Report by date and report number.

3.4.6 Deficiency/Discrepancy Resolution

3.4.6.1 Notification

If the immediate field recheck procedure specified in Section 3.4.2.4 indicates that the area does not meet the specifications, the Inspector shall immediately so inform the Client's Representative, and note this action on the Daily Field Report. If the area is immediately brought into compliance, this shall also be noted on the Daily Field Report and no further action is necessary. Otherwise, the procedures outlined in Section 3.4.6.3 apply..

3.4.6.2 Retest Procedure

Prior to accepting any reworked area, the Inspector shall retest it by checking moisture and degree of compaction in accordance with Sections 3.4.1 and 3.4.4 but with not less than 3 test locations, all of which must "PASS".

3.4.6.3 Tracking Failed Areas

Until the failed area is brought into compliance, the Inspector shall record on each Daily Field Report that this has not yet been accomplished. A specific notation shall be made on the Daily Field Report when the area has been brought into compliance and so proven by retesting according to Section 3.4.6.2.

3.5 Permeability Testing

3.5.1 Frequency of Testing

Samples for permeability testing shall be obtained at 10% of the field density test locations, selected at random.

3.5.2 Sampling Procedure

3.5.2.1 Area Preparation

The permeability and Atterberg sample shall be taken at a location no closer to the field density test hole than 6 inches, nor further than 12 inches. All loose surface material shall be removed prior to sampling.

3.5.2.2 Taking the Sample

The samples shall be taken using the 3 inch drive cylinder method specified in Section 3.4.6.3 (ASTM D2937), except that field weighing is not required. The permeability sample orientation shall have its axis parallel to the most likely flow direction, (i.e., vertical axis for horizontally placed lift of general fill material).

The permeability sample shall be the full size of the ring for at least two inches in length. The Inspector shall check the sample for obvious defects caused by sampling. Any defective or short sample shall be discarded and a new sample taken no closer to the previous location than 6 inches but still complying with Section 3.5.2.1. The hole(s) shall be backfilled with cement bentonite grout in accordance with Section 3.4.2.3

3.5.2.3 Sample Preservation

The sample shall be trimmed so that none protrudes from the drive cylinder. It shall then be placed into a plastic bag, which shall be indelibly marked with the location, lift, and Field Density Test number. It shall be returned to the laboratory under Sample Control (Section 3.5.4.3) the day it is taken.

3.5.3 Equipment and Calibration

3.5.3.1 *Equipment*

The equipment required for this sampling includes:

A. Sharpshooter Shovel
B. Plastic Bags
C. Clean Drive Cylinders
D. Modified Marshall Hammer

Note that cement bentonite grout are required for sealing the holes made during any permeability sampling.

3.5.4 Field Documentation

3.5.4.1 Test Location

The locations where any permeability samples are obtained must be clearly indicated by the Inspector on a Location Map. This is normally the map which locates the field density tests.

3.5.4.2 Data Sheet

A Sample Control Sheet shall indicate the sample number, density test reference number, lift number, etc.

3.5.4.3 *Transfer of Sample Custody*

A laboratory technician will sign for the sample on a Sample Control Sheet. If the sample is received during working hours, it shall be logged-in in the Inspector's presence. Otherwise, the sample shall be placed on the Ready Rack shelves.

3.5.5 Reporting

3.5.5.1 Internal

The Inspector's Daily Field Report shall document any permeability sampling which was performed and shall include the numbers and locations of the samples. The map showing the sample locations shall be given to the Senior Technician with the Daily Field Report on a daily basis.

3.5.6 Discrepancy/Deficiency Resolution

3.5.6.1 Notification

Since "PASS-OR-FAIL" depends on the results of laboratory testing, any discrepancies must be handled directly by the Project Engineer. The laboratory technician shall inform the Project Engineer of the status of all permeability testing daily.

GENERAL FILL MATERIAL TEST REQUIREMENTS
CONSTRUCTION QA/QC

Parameter	Limit	Test Procedure	Frequency	Approximate Number of Tests
Uncompacted Lift Thickness	Thickness 8"	Metal Yardstick or Tape	Once per 1,000 sq. ft. of material/lift	
Total General Fill Thickness	Thickness - varies	Survey	Survey grid 100 ft.; before-and-after points within 5 ft.	
Atterberg Limits	Liquid Limit 35 Plasticity Index 20	ASTM D4318	Once per 2,000 uncompacted cu. yd.	
Apparent Moisture Content	To be determined from Laboratory characterization	ASTM D2216	Once per 2,000 compacted cu. yd	
Standard Proctor	To be determined from Laboratory characterization	ASTM D698	Once per 250 cu. yd.,	
Classification	Laboratory classification of CH	ASTM 2487	Once per 2,000 cu. yd.	
Clod Control	Freedom from large clods, sticks, roots, or other extraneous matter	Visual	Continuous	Continuous
Compacted Soil Moisture Content	To be determined from laboratory characterization	Nuclear Gauge ASTM D3017 ASTM D2216	50 x 50 foot grid for area worked each day, but no less than three tests per day	

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GENERAL FILL MATERIAL TEST REQUIREMENTS
CONSTRUCTION QA/QC

Parameter	Limit	Test Procedure	Frequency	Approximate Number of Tests
Compacted Soil Density	To be determined from Laboratory characterization	Nuclear Gauge ASTM D-2922 Drive Cylinder Method D2937	50 x 50 foot grid for area worked each day, but no less than three tests per day	
Permeability	1×10^{-7} cm/sec	SW-846, Method 9100	Imported general fill material 10% of field density locations selected at random	
Surface Preparation for Liner Installation	Surface to be smooth and free from debris, rocks, etc.	Visual	Continuous	Continuous
Clean Soil Prior to Liner Installation	Plastic	Visual	As Required	Continuous

SECTION 4.0

GEOTEXTILES

4.0 GEOTEXTILES

4.1 Material

Geotextile material shall meet all requirements specified in the construction documents. The geotextile manufacturer shall submit a written, detailed Manufacturing Q/C Plan for review and approval no less than 14 days prior to installation. The manufacturer shall submit written certification that all material delivered to the site conforms to the construction specifications no less than 14 days prior to installation.

4.2 Handling and Placement

All geotextiles shall be handled in a manner to ensure they are not damaged. The following special handling requirements shall be adhered to:

4.2.1 On slopes, the geotextiles shall be secured in the anchor trench and then rolled out in such a manner as to continually keep the geotextile sheet in sufficient tension to preclude folds and wrinkles.

4.2.2 In presence of wind, all geotextiles shall be weighted with sandbags or the equivalent.

4.2.3 Geotextiles shall be cut using an approved cutter. If the material is being cut in place, special care must be taken to protect other geosynthetic materials from damage.

4.2.4 Care shall be taken not to entrap stones or excessive dust that could damage the geomembrane, or generate clogging of drains or filters.

4.3 Seams and Overlaps

Geotextiles may be seamed by thermal bonding or by sewing. No horizontal seams shall be allowed on side slopes.

4.3.1 On slopes steeper than 10 horizontal to 1 vertical, geotextiles shall be continuously sewn along the entire length of the seam. Geotextiles shall be overlapped a minimum of four (4) inches prior to sewing.

4.3.2 On bottoms and slopes shallower than 10 horizontal to 1 vertical geotextiles can be either sewn as indicated above or thermally bonded. If thermally bonded the geotextile shall be overlapped a minimum of eight (8) inches prior to seaming.

4.4 Repairs

Any holes or tears in the geotextile shall be repaired as follows:

4.4.1 On slopes - A patch made from the same geotextile shall be seamed into place. Should any tear exceed 10% of the width of the roll, that roll shall be removed from the slope and replaced.

4.4.2. Horizontal Areas - A patch made from the same geotextile shall be spot-seamed in place with a minimum of 12 inches overlap in all directions.

TABLE 4.1
GEOTEXTILE MATERIAL AND INSTALLATION
CONSTRUCTION QA/QC

PARAMETER	LIMIT	TEST PROCEDURE	APPROXIMATE NUMBER OF TESTS
Material	Per Approved Manufacturer Q/C Plan	Per Approved Manufacturer Q/C Plan	Per Approved Manufacturer Q/C Plan
Installation	Per Requirements of Section 4.0	Visual	Continuous

SECTION 5.0

DRAINAGE NET

5.0 DRAINAGE NET

5.1 Material

Drainage net material shall meet all requirements specified in the construction documents. The drainage net manufacturer shall submit a written detailed, manufacturing Q/C Plan for review and approval no less than 14 days prior to installation. The manufacturer shall submit written certification that all material delivered to the site conforms to the construction specifications no less than 14 days prior to installation.

5.2 Handling and Placement

The drainage net shall be handled in such a manner as to ensure that the drainage nets are not damaged in any way.

5.2.1 On slopes, the drainage nets shall be secured in the anchor trench and then rolled out in such a manner as to continually keep the drainage net sheet in tension. If necessary, the drainage net shall be positioned by hand after being unrolled to minimize wrinkles. Drainage nets can be placed in the horizontal direction (i.e., across the slope) in some special locations (e.g., at the toe of a slope, or when an extra layer of drainage net is required).

Such locations shall be identified by the Project Engineer in the field.

5.2.2 Drainage nets shall not be welded to geomembranes with extrusion welders. Drainage nets shall be cut using approved cutters, i.e., hook blade, scissors, etc. Care should be taken to prevent damage to underlying layers.

5.2.3 Care must be taken not to entrap dirt in the drainage net that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane.

5.3 Layering and Tying of Drainage Net

When several layers of drainage nets are installed, care should be taken to prevent the strands of one layer from penetrating the channels of the next layer, thereby significantly reducing the transmissivity. Layered drainage nets must be placed in the same direction and never laid perpendicular to the underlying drainage net. Adjacent drainage nets shall be joined according to the following requirements.

5.3.1 Adjacent rolls shall be overlapped by at least four (4) inches and securely tied.

5.3.2 Tying can be achieved by plastic fasteners. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed.

5.3.3 Tying shall be every five (5) feet along the slope, every two (2) feet across the slope and every six (6) inches in the anchor trench.

5.3.4 In the corners of the side slopes where overlaps between perpendicular drainage net strips are required, an extra layer of drainage net shall be unrolled along the slope, on top of the previously installed drainage net, from top to bottom of the slope.

5.3.5 When more than one layer of drainage net is installed, overlaps must be staggered and layers tied together.

5.4 Repairs

Any holes or tears in the drainage net shall be repaired by placing a patch extending two (2) feet beyond edges of the hole or tear. The patch shall be secured to the original drainage net by tying every six (6) inches. If the hole or tear width across the roll is more than 50% the width of the roll, the damaged area shall be cut out and the two (2) portions of the drainage net shall be joined.

SECTION 6.0

GEOMEMBRANE LINER

6.0 GEOMEMBRANE (LINER)

6.1 Material

Geomembrane material shall meet all requirements specified in the construction documents. The geomembrane manufacturer shall submit a written, detailed Manufacturing Q/C Plan for review and approval no less than 14 days prior to installation. The manufacturer shall submit written certification that all material delivered to the site conforms to the construction specifications no less than 14 days prior to installation.

6.2 Crest Anchorage System

6.2.1 The anchor trench shall be excavated by the general and/or the earthwork contractor to lines and widths shown on the design drawings prior to geomembrane placement.

6.2.2 Anchor trenches excavated in clay soils susceptible to desiccation cracks should be excavated only the distance required for that days liner placement to minimize the potential of desiccation cracking of the clay soils.

6.2.3 Corners in the anchor trench shall be slightly rounded where the geomembrane adjoins the trench to minimize sharp bends in the geomembrane.

6.3 Preparation for Geomembrane Deployment

6.3.1 Panel Layout

Prior to commencement of liner deployment, layout drawings shall be produced to indicate the panel configuration, location of seams and coordination with groundwater relief system, storm drainage system, geotextile and drainage construction for the project.

6.3.2 Identification

Each panel used for the installation shall be given a numeric or alpha-numeric identifier consistent with the layout drawing. This identification number shall be related to a manufacturing roll number that identifies the resin type, batch number, and date of manufacture.

6.4 Field Panel Placement

6.4.1 Location

The liner manufacturer will produce and submit a panel layout plan no less than 14 days prior to installation. The geomembrane layout plan shall be coordinated with and compatible to bonded

drainage geotextile layout plan. The manufacturer shall attempt to install field panels at the location indicated on the approved layout drawing. If the panels are deployed in a location other than that indicated on the layout drawings, the revised location shall be noted in the field on an "as-built" drawing which will be modified at the completion of the project to reflect actual panel locations. As-built drawings will be maintained by the liner installer.

6.4.2 Weather Conditions

Geomembrane deployment shall not be done during any precipitation, in the presence of excessive moisture (i.e. fog, dew), in an area of standing water, or during high winds.

6.4.3 Documentation of Panel Placement

Information relating to geomembrane panel placement including date, time, panel number, panel dimensions and location will be maintained.

6.4.3.1 If a portion of a roll is set back to be used at another time, the roll number will be written on the remainder of the roll in several places.

6.4.4 Method of Deployment

6.4.4.1 The method and equipment used to deploy the panels must not damage the geomembrane or the supporting subgrade surface.

6.4.4.2 No personnel working on the geomembrane will wear shoes that can damage the geomembrane or engage in actions which could result in damage to the geomembrane.

6.4.4.3 Adequate temporary loading and/or anchoring, (i.e. sandbags, tires), which will not damage the geomembrane, will be placed to prevent uplift of the geomembrane by wind.

6.4.4.4 The geomembrane will be deployed in a manner to minimize wrinkles.

6.4.5 Any damage to a panel of geomembrane will be repaired in accordance with Paragraph 8.3. Any area of a panel seriously damaged (torn, twisted, or crimped) will be marked, cut out, and removed from the work area with resulting seaming and/or repairs performed in accordance with Paragraph 8.3 of this document.

6.5 Geomembrane Field Seaming

6.5.1 General Requirements

6.5.1.1 Layout

In general seams shall be oriented parallel to the slope, i.e., oriented along, not across the slope. Whenever possible, horizontal seams should be located on the base of the cell, not less than five (5) feet from the toe of the slope. Each seam made in the field shall be numbered in a manner that is compatible with the panel layout drawing. Seaming information to include seam number, welder ID, machine number, temperature setting and a weather conditions will be maintained on a Panel Seaming Form.

6.5.1.2 Personnel

All personnel performing seaming operations shall be trained in the operation of the specific seaming equipment being used and will qualify by successfully welding a test seam as described in Paragraph 6.5.3. The project foreman will provide direct supervision of all personnel seaming to verify proper welding procedures are followed.

6.5.1.3 Equipment

6.5.1.3.1 Fusion Welding

Fusion Welding consists of placing a heated wedge, mounted on a self propelled vehicular unit, between two (2) overlapped sheets such that the surface of both sheets are heated above the polyethylene's melting point. After being heated by the wedge, the overlapped panels pass through a set of preset pressure wheels which compress the two (2) panels together to form the weld. The fusion welder is equipped with a temperature readout device which continuously monitors the temperature of the wedge.

6.5.1.3.2 Extrusion Fillet Welding

Extrusion fillet welding consists of introducing a ribbon of molten resin along the edge of the seam overlap of the two (2) sheets to be welded. A hot-air preheat and the molten polymer causes some of the material of each sheet to be liquified resulting in a

homogeneous bond between the molten weld bead and the surfaces of the sheets. The extrusion welder is equipped with gauges giving the temperature in the appartus and the preheat temperature at the nozzle.

6.5.1.4 Weather Conditions

The Liner Manufacturers Project Superintendent and the Q/C Coordinator and the results of test seams will will determine seaming restrictions by weather. Many factors, such as ambient temperature, humidity, wind, sunshine, etc., can effect the integrity of field seams and must be taken into account when deciding whether or not seaming should proceed. Test seams, as described in Paragraph 6.5.3. are required prior to daily production seaming to determine if the weather conditions will effect the manufacturer's ability to produce quality seams. Additional non-destructive and destructive testing of production seams substantiate the decision made by the Project Superintendent to seam on any given day.

6.5.2 Seam Preparation

6.5.2.1 Fusion Welding

6.5.2.1.1 Overlap the panels of Geomembrane approximately four (4) to six (6) inches prior to welding.

6.5.2.1.2 Clean the seam area prior to seaming to assure the area is clean and free of moisture, dust, dirt, debris of any kind. No grinding is required for fusion welding.

6.5.2.1.3 Adjust the panels so that seams are aligned with the fewest possible number of wrinkles and "fishmouths".

6.5.2.1.4 A movable protective layer may be used, at the discretion the Project Superintendent, directly below the overlap of geomembrane that is to be seamed to prevent buildup of moisture between the panels.

6.5.2.2 Extrusion Fillet Welding

6.5.2.2.1 Whenever possible, extrusion welded seams will be pre-beveled prior to heat-tacking into place.

6.5.2.2.2 Overlap the panels of Geomembrane a minimum of six (6) inches.

6.5.2.2.3 Temporarily bond the panels of Geomembrane to be welded taking care not to damage the Geomembrane.

6.5.2.2.4 Grind seam overlap prior to welding within one (1) hour of the welding operation in a manner that does not damage the Geomembrane. Grind marks should be covered with extrudate whenever possible. In all cases grinding should not extend more than one-quarter (1/4) inch past the edge of the area covered by the extrudate during welding.

6.5.2.2.5 Clean the seam area prior to seaming to assure the area is clean and free of moisture, dust, dirt, and debris of any kind.

6.5.2.2.6 Purge the extruder prior to beginning the seam to remove all heat-degraded extrudate from the barrel. The purged extrudate will be placed on scrap material so as to prevent contact with good liner.

6.5.2.2.7 Keep welding rod clean and dry.

6.5.3 Trial Welds

Trial welds shall be conducted by welding technicians prior to each seaming period, every five (5) hours, as weather conditions dictate or as requested by QC Coordinators if welding problems are suspected. All trial welds will be conducted under the same conditions as will be encountered during actual seaming. Unless authorized by foreman and QC Coordinators once qualified by a passing trial weld, welding technicians will not change parameters (temperature, speed, wheel adjustment) without performing another trial weld.

6.5.3.1 Trial Weld Length

The trial weld shall be at least five (5) feet long and should be made by joining two (2) pieces of geomembrane at least 9" in width.

6.5.3.2 Sample Procedure

6.5.3.2.1 Visually inspect the seam for squeeze out, footprint, pressure, and general appearance.

6.5.3.2.2 Cut 3 one-inch wide specimens, one from the middle of the seam and one foot from each end of the seam. The specimens shall then be tested in peel using a field tensometer and shall exhibit a film tearing bond (FTB).

If any specimen fails, the entire procedure shall be repeated. In the case of double track fusion welded seams, both welds must exhibit a FTB in order to be considered passing.

6.5.3.2.3 If repeat tests performed utilizing reasonable sets of welding parameters also fail, the seaming apparatus shall not be accepted and shall not be used for seaming until the deficiencies are corrected and a passing test seam is achieved.

6.5.3.3 Trial Weld Documentation

6.5.3.3.1 QC Coordinator and/or assistant will be present during peel testing and will record date, time, operator, machine number, ambient and operator, machine number, ambient and operating temperatures, speed setting, peel values and pass/fail designation.

6.5.3.3.2 All test results records shall be maintained.

6.5.3.3.3 The QC Coordinator will give final approval to proceed with welding after observing trial welds.

6.5.4 General Seaming Procedures

6.5.4.1 Seaming shall extend to the outside edge of panels to be placed in the anchor trench.

6.5.4.2 While welding a seam, monitor and maintain the proper overlap.

6.5.4.3 Inspect seam area to assure area is clean and free of moisture, dust, dirt, debris of any kind.

6.5.4.4 Welding technicians will periodically check operating temperature and speed.

6.5.4.5 Align wrinkles at the seam overlap to allow welding through the wrinkle.

6.5.4.6 Fishmouths or wrinkles at seam overlaps that cannot be welded through shall be cut along the ridge in order to achieve a flat overlap. The cut fishmouth or wrinkle shall be patched with an oval or round patch of the same geomembrane extending a minimum of six (6) inches beyond the cut in all directions.

6.5.4.7 All cross/butt seams between two (2) rows of seamed panels shall be welded during the coolest time of the day to allow for contraction of the geomembrane.

6.5.4.8 Prior to welding cross/butt seams, the top and bottom overlap of intersecting fusion welded seams will be trimmed six (6) inches. Intersecting extrusion fillet welded seams will be ground to flatten the extrusion bead prior to welding butt seams.

6.5.4.9 All "T" joints produced as a result of cross/butt seams shall be extrusion fillet welded. Overlap on each "leg" of the "T" joint will be trimmed back four (4) inches. Then grind two (2) inches minimum on each of the three legs of the "T" and extrusion weld all of the area prepared by grinding.

6.5.4.10 Whenever possible, welding technicians will cut a test strip at the end of every seam. Prior to welding the next seam, the Test Strip will be tested for peel with parameters similar to those of trial welds listed on the Destructive Testing Data Form. The QC Coordinator will observe all test strips and may request additional trial welds, based on observations.

6.5.4.11 In the event failing seam test strips are encountered, the welding machine will be taken out of service until a passing trial weld is obtained, and additional test strips will be taken to localize the flaw.

6.5.4.12 Results of field seam test strips will be maintained.

6.5.4.13 The QC Coordinator may, after consulting with the Site Superintendent, take destructive samples from any seam, if defects are suspected.

6.5.5 Seaming Documentation

6.5.5.1 All seaming operations will be documented by the QC Coordinator or a designated assistant. Welding technicians will mark on the liner with Mean Streak permanent markers at the start of all seams, information regarding welder initials, machine number and set temperature. QC Coordinator or assistant will record date, time, seam number, welder ID, machine ID, set temperature and weather conditions and speed as determine from trial welds on the Seaming Information Form.

6.5.5.2 Welding Technicians will periodically check operating temperature and speed and mark the information along the seam.

6.5.5.3 QC Coordinator will make periodic checks on welding operations to verify overlap, cleanliness, etc.

SECTION 7.0

SEAM TESTING - GEOMEMBRANE LINER

7.0 SEAM TESTING - GEOMEMBRANES

7.1 Concept

The fusion welding process is composed of a primary seam and a secondary track that creates an unwelded channel. The presence of an unwelded channel permits fusion seams to be tested by inflating the sealed channel with air to a predetermined pressure and observing the stability of the pressurized channel over time.

7.2 Air Pressure Testing

7.2.1 Equipment for Air Testing

7.2.1.1 An air pump (manual or motor driven) capable of generating and sustaining a pressure between 25 to 30 psi.

7.2.1.2 A rubber hose with fittings and connections.

7.2.1.3 A sharp hollow needle, or other approved pressure feed device with a pressure gauge capable of reading and sustaining a pressure between 25 to 30 psi.

7.2.2 Procedure for Air Testing

7.2.2.1 Seal both ends of the seams to be tested.

7.2.2.2 Insert needle or other approved pressure feed device into the sealed channel created by the fusion weld.

7.2.2.3 Inflate the test channel to a pressure of approximately 30 psi, and maintain the pressure within the range listed in Initial Pressure Schedule. Close valve, observe and record initial pressure after approximately 2 minutes.

INITIAL PRESSURE SCHEDULE*

MATERIAL (MIL)	MIN. PSI	MAX. PSI
60	27	35

*Initial pressure settings are read after a two minute "relaxing period". The purpose of this "relaxing period" is to permit the air temperature and pressure to stabilize.

7.2.2.4 Observe and record the air pressure five (5) minutes after "relaxing period" ends and initial pressure setting is recorded. If loss of pressure exceeds the following

or if the pressure does not stabilize, locate faulty area and repair in accordance with Section 7.2.3.

MAXIMUM PERMISSIBLE PRESSURE DIFFERENTIAL
AFTER 5 MINUTES - HDPE

MATERIAL (MIL)	PRESSURE DIFF.
60	3 psi

7.2.2.5 At the conclusion of all pressure tests, the end of the air-channel opposite the pressure gauge is cut. A decrease in gauge pressure must be observed or the air channel will be considered "blocked" and the test will have to be repeated from the point of blockage. If the point of blockage cannot be found, cut the air channel in the middle of the seam and treat each half as a separate test.

7.2.2.6 Remove needle or other approved pressure feed device and seal resulting hole by extrusion welding.

7.2.3 In the event of a Non-Complying Air Pressure Test, the following procedure shall be followed:

7.2.3.1 Check seam end seals and retest seams.

7.2.3.2 If a seam will not maintain the specified pressure, the seam should be visually inspected to localize the flaw. If this method is unsuccessful, cut one (1) inch samples from each end of the seam.

7.2.3.3 Perform destructive peel tests on the samples using the field tensometer.

7.2.3.4 If all samples pass destructive testing remove the overlap left by the wedge welder and vacuum test the entire length of seam in accordance with Paragraph 7.3.

7.2.3.4.1 If a leak is located by the vacuum test, repair by extrusion fillet welding. Test the repair by vacuum testing.

7.2.3.4.2 If no leak is located by the vacuum test, repair by extrusion fillet welding. Test the repair by vacuum testing.

7.2.3.5 If one or more samples fail the peel tests, additional samples will be taken in accordance with Paragraph 7.4.3.

7.2.3.5.1 When two (2) passing samples are located, the seam between these two (2) locations will be considered non-complying. The overlap left by the wedge welder will be heat racked in place along the entire length of seam and the non-complying portion of seam will be extrusion fillet welded.

7.2.3.5.2 Test the entire length of the repaired seam by vacuum testing in accordance with Paragraph 7.3.

7.2.4 General Air Testing Procedures

7.2.4.1 The opposite end of the air channel will in all cases be pierced to assure that no blockages of the air channel have occurred.

7.2.4.2 Whenever possible seams should be air-tested prior to completing butt seams to avoid having to cut into liner. All cuts through the liner as a result of testing will be patched.

7.2.4.3 All needle holes in air channels remaining after testing will be circled by testing crew and will be required with an extrusion bead.

7.2.5 Air Pressure Testing Documentation

All information regarding air-pressure testing, (date, initial time and pressure, final time and pressure, pass/fail designation and technicians initials) will be written at both ends of the seam, or portion of seam tested. All of the above information will also be logged the QC Coordinator.

7.3 Vacuum Testing

This test is used when the geometry of the weld makes air pressure testing impossible or impractical or when attempting to locate the precise location of a defect believed to exist after air pressure testing.

7.3.1 Equipment for Vacuum Testing

7.3.1.1 Vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.

7.3.1.2 Vacuum pump assembly equipped with a pressure controller and pipe connection.

7.3.1.3 A rubber pressure/vacuum hose with fittings and connections.

7.3.1.4 A bucket and means to apply a soapy solution.

7.3.1.5 A soapy solution.

7.3.2 Procedure for Vacuum Testing

7.3.2.1 Trim excess overlap from the seam, if any.

7.3.2.2 Turn on the vacuum pump to reduce the vacuum box to approximately 10 in. of mercury, i.e., 5 psi gauge.

7.3.2.3 Apply a generous amount of a strong solution of liquid detergent and water to the area to be tested.

7.3.2.4 Place the vacuum box over the area to be tested and apply sufficient downward pressure to "seat" the seal strip against the liner.

7.3.2.5 Close the bleed valve and open the vacuum valve.

7.3.2.6 Apply a minimum of 5 psi vacuum to the area as indicated by the gauge on the vacuum box.

7.3.2.7 Ensure that a leak tight seal is created.

7.3.2.8 For a period of approximately 15 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.

7.3.2.9 If no bubbles appear after 15 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 in. overlap, and repeat the process.

7.3.3 Procedure for non-complying test

7.3.3.1 Mark all areas where soap bubblers appear and repair the marked areas in accordance with Paragraph 8.3.

7.3.3.2 Retest repaired areas.

7.3.4 General Vacuum Testing Procedures

7.3.4.1 Vacuum box testing will be performed by qualified construction personnel with frequent supervision by the QC Coordinator.

7.3.4.2 Overlap must be trimmed prior to vacuum boxing all seams.

7.3.4.3 Special attention shall be exercised when vacuum testing "t" seams or patch intersections with seams.

7.3.5 Vacuum Testing Documentation

7.3.5.1 Vacuum testing crew will use Mean Streak permanent markers to write on liner indicating tester's initials, date and pass/fail designation on all areas tested.

7.3.5.2 Records of vacuum testing will be maintained by the QC Coordinator or testing crew.

7.4 Destructive Testing

7.4.1 Concept

The purpose of destructive testing is to determine and evaluate seam strength. These tests require direct sampling and thus subsequent patching. Therefore destructive testing should be held to a minimum to reduce the amount of repairs to the geomembrane.

7.4.2 Procedure for Destructive Testing

7.4.2.1 Destructive test samples shall be marked and cut out randomly at a minimum average frequency of one test location every 500 feet of seam length.

7.4.2.2 Location of destructive samples will be selected by QC Coordinator with samples cut by Construction Personnel.

7.4.2.3 Destructive samples should be taken and tested as soon as possible after the seams are welded (the same day), in order to detect possible problems in a timely manner.

7.4.2.4 QC Coordinator will observe all destructive testing and record date, time, seam number, location, and test results.

7.4.2.5 All destructive test locations with pass/fail designation will be marked on liner with permanent Mean Steak markers.

7.4.2.6 Sample Size

7.4.2.6.1 The sample should be twelve (12) inches wide with a seam sixteen (16) inches long centered lengthwise in the sample. The sample may be increased in size to accommodate independent laboratory testing by the owner at the owner's request or by specific project specifications.

7.4.2.6.2 A one (1) inch specimen shall be cut from each end of the test seam for field testing.

7.4.2.6.3 The two one (1) inch wide specimens shall be tested in the field in a tensometer for peel. If any field specimen fails to pass, it will be assumed the sample fails destructive testing. The procedure outlined in Paragraph 7.4.3. shall be followed to locate passing samples to send to the laboratory.

7.4.3 Procedure in the event of Destructive Test Failure

7.4.3.1 Cut additional field samples for testing. In the case of a field production seam, the samples must lie a minimum of ten (10) feet in each direction from the location of the failed sample. Perform a field test for peel strength. If these field samples pass, then laboratory samples can be cut and forwarded to the laboratory for full testing.

7.4.3.1.1 If the laboratory samples pass, then reconstruct the seam between the two (2) passing sample locations according to procedures detailed in Section 8.3.

7.4.3.1.2 If either of the samples fail, then additional samples are taken in accordance with the above procedure until two (2) passing samples are found to establish the zone in which the seam should be reconstructed.

7.4.3.2 All passing seams must be bounded by two (2) locations from which samples passing laboratory destructive tests have been taken.

7.4.3.3 In cases of reconstructed seams exceeding 150 feet, a destructive sample must be taken and pass destructive testing from within the zone in which the seam has been reconstructed.

SECTION 8.0

DEFECTS AND REPAIRS - GEOMEMBRANE LINER

8.0 DEFECTS AND REPAIRS

8.1 The QC Coordinator and Project Superintendent shall conduct a detailed walk through and visually check all seams and non-seam areas of the geomembrane for defects, holes, blisters, and signs of damage during installation.

8.2 All installation personnel shall, at all times, be on the lookout for any damaged areas. Damaged areas shall be marked and repaired.

8.3 Repair Procedures

Any portion of the geomembrane or geomembrane seam showing a flaw, or failing a destructive or non-destructive test shall be repaired. Several procedures exist for repair and the decision as to the appropriate repair procedure shall be made by the Project Superintendent. Procedures available for repair:

8.3.1 Patching - used to repair large holes, tears and destructive sample locations. All patches shall extend at least six (6) inches beyond the edges of the defect and all corners of patches shall be rounded.

8.3.2 Grinding and welding - used to repair sections of extruded fillet seams.

8.3.3 Spot welding or seaming - used to repair small tears, pinholes or other minor localized flaws.

8.3.4 Capping - used to repair lengths of failed extrusion or fusion welded seams.

8.3.5 Extrude overlap along the length of failed fusion welded seams.

8.3.6 Removal of a bad seam and replacement with a strip of new material seamed into place.

8.4 Verification of Repairs

Every repair shall be non-destructively tested using the methods set out in Paragraph 7.2. Repairs which pass the non-destructive test shall be deemed adequate. Repairs in excess of 150 feet require a destructive test. Repair test results shall be logged and the repair location shall be recorded on an as-built drawing.

SECTION 9.0

6-INCH (MINIMUM) SAND LAYER

9.0 6-INCH (MINIMUM) SAND LAYER

9.1 Material Control

9.1.1 Frequency of Material Control Testing.

9.1.1.1 Sand Layer Material Classification Tests

Samples shall be secured for classification by grain size analysis (ASTM C117 and ASTM C136), Atterberg Limits (ASTM D4318) and apparent moisture content (ASTM D2216) testing at a rate not less than 1 per 5,000 cubic yards. Prior to construction, the Contractor shall notify the Project Engineer of the source(s) of his imported materials. During construction, the Project Engineer shall be notified of any changes in imported material sources.

9.1.2 Sampling Procedure

9.1.2.1 Sand Layer

For Soil Classification test sample size and method shall be in accordance with ASTM D2487. For Atterberg Limits and Apparent Moisture test, approximately a 1/2 pound sample shall be secured from the exact location of a field density test. The depth shall not exceed 4 inches. The total sample shall be sealed into a plastic bag, identified with the field density test number using an indelible marker, and returned to the laboratory under Sample Control (Section 9.1.4.3).

9.1.3 Equipment and Calibration

9.1.3.1 Equipment

The equipment necessary for this sampling includes:

A. Shovel
B. Plastic and Cloth Bags
C. Indelible Marker

9.1.4 Field Documentation

9.1.4.1 Test Location

The locations where any material samples are obtained must be clearly indicated by the Inspector. The locations of New Material sources may be described in

words. For samples taken during material placement, a Location Map shall be prepared.

9.1.4.2 Data Sheet

The Sample Control Sheet shall indicate the sample number.

9.1.4.3 Transfer of Sample Custody

A laboratory technician will sign for the sample on the Sample Control Sheet. If the sample is received during working hours, it shall be logged-in in the Inspector's presence. Otherwise, the sample shall be placed on the Ready Rack shelves. The laboratory supervisor will place a copy of the signed Control Sheet in the Inspector's box.

9.1.5 Reporting

9.1.5.1. Internal

The Inspector's Daily Field Report shall document that material control testing was performed, and shall include a map showing the numbers and locations of the tests.

9.1.6 Deficiency/Discrepancy Resolution

9.1.6.1 Notification

If the Inspector's visual observations indicate that the material will not meet the specifications, he shall immediately so inform the Client's Representative and note this action on the Daily Field Report. The exact location of in-place questionable material shall be accurately documented for future reference. The actual "PASS-OR-FAIL" depends on the results of the laboratory tests. If a sample fails, the Senior Technician shall immediately inform the Project Engineer, the Inspector and the Client's Representative by telephone, confirming with a memo as soon as practicable.

9.1.6.2 Retest Procedure

In the event of failure, the Inspector shall resample at 3 locations within a 10 foot radius, composite the samples, and submit the composite sample to the

laboratory marked for special expedited handling. The persons listed in Section 9.1.6.1 shall be notified using the specified procedures. At this point, the Project Engineer will specify a more comprehensive investigation if warranted in his opinion.

9.2 Lift Control/Total Thickness Control

9.2.1 Frequency of Testing

9.2.1.1 Individual Uncompacted Lifts - Sand Layer Material

The Inspector shall verify the uncompacted lift thickness at a rate of at least one such determination per 500 square feet of material placed, but also not less than once per lift.

9.2.1.2 Clod Control

Clod size control and inspection for roots, sticks, and other extraneous matter shall be continuous during material placement.

9.2.1.3 Total Sand Layer Thickness

The Inspector shall verify the total sand layer thickness at a rate, of one such determination per 1,000 sq. ft.. These tests shall be performed upon completion of a final lift.

9.2.2 Procedures

9.2.2.1 Lift Thickness

The Inspector shall carefully make a shovel hole through the uncompacted material, but shall not damage any underlying lift or liner. The depth shall be measured to the nearest 0.5 inch; this measurement shall be made from the bottom of a 2 x 4 wood beam placed across the top of the hole. Upon completion of the measurement, the hole shall be refilled.

9.2.2.2 Clod Control

The Inspector shall maintain continuous visual inspection for clod size, presence of roots, sticks, or other extraneous matter.

9.2.2.3 Inspector's Immediate Action

If the measured lift thickness does not exceed 120% of the specified value, the area shall be considered as "PASS". Otherwise, the Inspector shall immediately retest at three locations within 10 feet of the original test. If the average of the three tests is a "PASS", the area shall be considered as "PASS", and no further action is necessary. Otherwise, the procedure of Section 9.2.6 apply.

9.2.2.4 Total Sand Layer Thickness

The Inspector shall verify the total sand layer thickness using a hand-type auger. Penetration shall be made through the entire sand layer thickness. The depth shall be measured to the nearest 0.5 inch. Upon completion of the measurement, the hole shall be filled with sand. The inspector shall use caution when sampling to not damage the liner.

9.2.3 Equipment and Calibration

9.2.3.1 Equipment

The necessary equipment for this work consists of:

A. Sharpshooter Shovel
B. Metal Yardstick or Tape
C. Wood 2 x 4 Beam
D. Hand-type Auger meeting ASTM 1452

9.2.4 Field Documentation

9.2.4.1 Test Locations

The locations where the lift thicknesses and total sand layer thicknesses were determined shall be numbered sequentially and marked on separate location maps. The maps shall be referenced to the Inspector's Daily Field Report by date and report number.

9.2.4.2 Clod Control

The Inspector shall mark on the location map of Section 9.2.4.1 the areas approved for clod size and freedom from sticks, roots, or other extraneous matter.

9.2.4.3 Data Sheet

The required data includes:

A. Data
B. Inspector
C. Location
D. Lift Number
E. Table of Test Numbers and Measured Depths

The data sheet shall be referenced to the Inspector's Daily Field Report by date and report number.

9.2.5 Reporting

9.2.5.1 Internal

The Inspector's Daily Field Report shall document that thickness determination were performed, and shall include a map showing the numbers and locations of the tests.

9.2.6 Deficiency/Discrepancy Resolution

9.2.6.1 Notification

If the measurements indicate that the lift thicknesses, clod control, etc., do not meet the specifications, the Inspector shall immediately so inform the Client's Representative, and note this action on the Daily Field Report. If the area is immediately brought into compliance, this shall also be noted on the Daily Field Report and no further action is necessary. Otherwise, the procedures outlined in Section 9.2.6.2 apply. In the case of the total sand layer thickness determination, compliance will not be assured until all augers are complete. Upon checking the auger results, notify the Client's Representative of compliance or any areas of discrepancy by telephone immediately, and confirm by memo as soon as practicable.

9.2.6.2 Retest Procedure

A. Lift Thickness

Prior to accepting any reworked area, the Inspector shall retest it by checking depth at 3 locations within a 20 foot radius.

3. Clod Size/Roots

The Inspector shall perform a thorough visual inspection of failed areas prior to acceptance.

C. Total Sand Layer Thickness

If there are deficiencies in total sand layer thickness, the entire area bounded by points which did not comply will be considered as failed. If the deficiency is 4 inches or less, addition of one lift (loose thickness 6 inches minimum) over this area will be adequate. Otherwise, that area must be re-augered for thickness verification prior to acceptance.

9.2.6.3 Tracking Failed Areas

Until the failed area is brought into compliance, the Inspector shall record on each Daily Field Report that this has not yet been accomplished. A specific notation shall be made on the Daily Field Report when the area has been made acceptable and so proven by depth checking.

9.3 Compaction of Sand Layer Material

9.3.1 General

No specific testing will be required for the compaction of the sand layer material. Minimum compaction shall consist of one (1) pass of an approved tracked vehicle per lift. In no case shall a lift or area receive more than three (3) passes. The tracked vehicle shall not exceed 40,000 pounds gross weight and shall have wide steel tracks.

SECTION 10

IN FIELD QUALITY ASSURANCE

In Field Quality Assurance

Vendor of liner material shall submit copies of "In-Field Quality Assurance Forms" for inspection and acceptance by owner. The following forms are required but not restricted only to those listed below:

1. Material Delivery Report
2. Pre-Start Site Inspection
3. Soil Subgrade Acceptance
4. Equipment List
5. Personnel Responsibility and Resume
6. Geomembrane Field Seam Strength Test Sheet
7. Geomembrane Seaming Record
8. Geomembrane Seam Sample
9. Sampling Chain of Custody Record
10. Geomembrane Air/Vacuum Test Record
11. Problem/Solution Data Sheet
12. Construction Managers Daily Field Report
13. Certificate of Acceptance Sheet
14. Photography Log
15. Report of Accident Form(s)

SECTION 11.0

LABORATORY TESTING

11.0 LABORATORY TESTING OF SOILS

11.1 Atterberg Limits (Liquid and Plastic)

11.1.1 Specified Methods

These tests shall be conducted in accordance with ASTM D4318. The One-Point, Wet Preparation procedure (Method C, Paragraph 1.1.1 of D4318) shall be the standard method; any other method shall be so indicated.

11.1.2 Modifications

The natural moisture content (ASTM D2216) shall be determined for each sample tested for Atterberg Limits.

11.1.3 Calibration

The height-of-drop of the Liquid Limit device shall be verified prior to each Liquid Limit Determination. The grooving tools, block, and cam of this device shall be inspected and calibrated according to Paragraph 9 of ASTM D4313 at least weekly. Any new Liquid Limit device shall be fully calibrated prior to use.

11.1.4 Reporting

The results of this test shall be furnished to the Engineer on the test sheet, with the results expressed to the nearest whole number %. The Engineer shall maintain tabulations of the results on the test sheet.

11.2 Permeability Testing

11.2.1 Specified Method

The basic test procedures shall be as given in EPA Method 9100.

11.2.2 Sample Preparation

The samples shall be prepared for testing as follows:

A. Drive Cylinder Samples (Section 3.5).

These shall be tested in their drive cylinders. The ends shall be trimmed flat but not smeared. The sample length, diameter, and weight (with cylinder) shall be recorded.

B. Laboratory-Compacted Samples

If the samples are compacted into drive cylinders, they shall be prepared as outlined in 11.2.2 A. Samples trimmed from the proctor plugs shall be trimmed to a diameter of about 2 inches, measured, and weighed. The annulus between the wall of a fixed-wall permeameter and the sample shall be sealed with bentonite paste; the clear-wall permeameters shall be used.

C. Triaxial Permeability Samples

These shall be trimmed, measured, and weighed, then placed into the membrane.

11.2.3 Gradient

The maximum hydraulic gradient across a sample shall not exceed 100.

11.2.4 Length of Test

The test shall be conducted until a steady-state flow regime is achieved as indicated by three successive readings showing the same permeability values within 10%. In no case, however, shall the test length be less than 72 hours for clays, or less than four separate runs for falling-head tests which virtually empty the pipettes within 8 hours.

11.2.5 Permeants

The permeating fluid for all "water" tests shall be normal tap (potable).

11.2.6 Classification

The Senior Technician shall ensure that a classification test is directly associated with each permeability test. The classification shall be by Atterberg Limits (ASTM D4318). The apparent moisture content (ASTM D2216) and density (ASTM D2937) shall be determined on each permeability sample.

11.2.7 Calibration

Each permeameter shall be calibrated monthly by running water through the full apparatus with no soil in the permeameter.

11.2.8 Reporting

The test results shall be computer-processed by the laboratory technician using the program PERM. The Engineer shall be furnished the test sheet and the printout, plus the accompanying classification data. The Engineer or his designated assistant shall prepare a Result Sheet. It shall include:

*Sample Identification
*Moisture Content (to 0.1%) and Density (to 0.1 pcf)
*Classification Test Results
*Gradient Used
*Permeability (kh or Kv) to 2 significant layers
*For clay cap plugs, the field density test results
*Sample Classification under ASTM D2487

11.3 Proctor Tests

11.3.1 Specified Method

The test shall be conducted according to ASTM D698 using the mold of Paragraph 3.1.1. Moist Preparation (Paragraph 4.1.4) shall be used.

11.3.2 Modifications

There shall be at least five moisture-density points initially, of which at least two shall be dry of apparent optimum and at least two wet of apparent optimum. After the apparent optimum is determined, a test portion shall be prepared at that moisture content and compacted.

11.3.3 Calibration

The apparatus shall be calibrated according to Paragraph 3 of D698 prior to use on the project and at least quarterly thereafter.

11.3.4 Classification

After completion of the proctor test, a sample shall be tested for classification, i.e., Atterberg Limits (ASTM D4318) shall be determined for cohesive materials.

11.3.5 Reporting

The laboratory technician shall furnish the Engineer with a Compaction Test sheet, plus a classification data and a Proctor curve and assign the Curve Number.

11.4 Soil Classification Tests (Laboratory

11.4.1 Specified Method

The test shall be conducted according to ASTM D2487.

11.4.2 Reporting

The laboratory technician shall furnish the Project Engineer with a report containing the classification of the soil tested and all pertinent data.

SECTION 12.0

MISCELLANEOUS CONSTRUCTION ITEMS

12.0 MISCELLANEOUS CONSTRUCTION ITEMS

12.1 Storm Drainage Work

12.1.1 Storm Drainage Pipes

12.1.1.1 Materials and Installation

The QC Technician shall continuously visually monitor the materials and installation of drainage pipes for conformance to the project plans and specifications. The Contractor shall provide certificates of conformance from drainage pipe manufacturers prior to construction.

12.1.2 Storm Drainage, Manholes and Incidental Concrete Work

12.1.2.1 Materials and Installation

The QC Technician shall continuously visually monitor the materials and installation of storm drainage, manholes and incidental concrete work for conformance to the project plans and specifications. The Contractor shall provide certificates of conformance for all materials including pre-cast manholes, if used, prior to construction.

12.1.3 Re-Shape Existing Earthen Ditch

12.1.3.1 Excavation

The QC Technician shall continuously visually monitor the re-shaping of the existing earthen ditches for conformance to project plans and specifications.

12.1.4 Geotextile Fabric

12.1.4.1 Material and Installation

The QC Technician shall continuously visually monitor the materials and installation of geotextile fabric used as erosion protection for conformance to the project plans and specifications. The Contractor shall provide certificates of conformance for geotextile fabric from respective supplier and manufacturer prior to construction.

12.1.5 Reporting

12.1.5.1 Internal

The Inspector's Daily Field Report shall document the type and quantity of material delivered to the site, the work performed and the status of the materials and work performed (i.e., accepted or rejected).

12.1.6 Deficiency/Discrepancy Resolution

12.1.6.1 Notification

If visual and/or test results indicate that any materials or work performed does not conform to the project plans and specifications, the Inspector shall immediately so inform the Client's Representative and note this action on the Daily Field Report. If the material or work is immediately brought into compliance, this shall also be noted on the Daily Field Report and no further action is necessary. Otherwise, the procedures outlined in Section 12.1.6.2 apply.

12.1.6.2 Tracking Failed Areas

Until the rejected material or area of work is brought into compliance, the Inspector shall record on each Daily Field Report that this has not yet been accomplished. A specific notation shall be made on the Daily Field Report when the area has been made acceptable.

12.2 Groundwater Relief Collection System

12.2.1 Gravel, Collection Pipe, Sock Wrap, and Appurtenances

12.2.1.1 Material and Installation

The QC Technician shall continuously visually monitor the materials and installation of gravel, collection pipe, sock wrap, and appurtenances for conformance to the project plans and specifications. The Contractor shall provide certificates of conformance from the gravel supplier and collection pipe, sock wrap manufacturers prior to construction.

12.2.2 Reporting

12.2.2.1 Internal

The Inspector's Daily Field Report shall document the type and quantity of material delivered to the site, the work performed and the status of the materials and work performed (i.e., accepted or rejected).

12.2.3 Deficiency/Discrepancy Resolution

12.2.3.1 Notification

If visual and/or test results indicate that any materials or work performed does not conform to the project plans and specifications, the Inspector shall immediately so inform the Client's Representative, and note this action on the Daily Field Report. If the material or work is immediately brought into compliance, this shall also be noted on the Daily Field Report and no further action is necessary. Otherwise, the procedures outlined in Section 12.2.3.2 apply.

12.2.3.2 Tracking Failed Areas

Until the rejected material or area of work is brought into compliance, the Inspector shall record on each Daily Field Report that this has not yet been accomplished. A specific notation shall be made on the Daily Field Report when the area has been made acceptable.

APPENDIX P

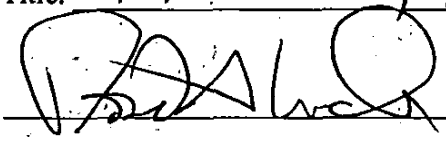
CERTIFICATION OF COMPLIANCE

LAC 33:VII.519.R

Certification: I have personally examined and am familiar with the information submitted in the attached document, and I hereby certify under penalty of law that this information is true, accurate, and complete to the best of my knowledge. I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or imprisonment.

Date: 10/13/2006

Name and Title: D.A. LUECKE, PLANT MANAGER

Signature: 

The completed Legal Signatory Authority follows this page.

PROOF OF LEGAL SIGNATORY AUTHORITY

WHEREAS certain federal and state environmental laws require certain permit applications, reports, or other documents to be executed on behalf of a corporation by a Principal Corporate Officer or by an official having significant policy or decision-making responsibility:

and

WHEREAS the Manager in the responsible charge of ExxonMobil Chemical Company Baton Rouge Plastics Plant is an official having significant policy and decision-making responsibilities within the Company:

NOW, THEREFORE, I, D. A. LUECKE, PLANT MANAGER of ExxonMobil Chemical Company Baton Rouge Plastics Plant, on this 13 day of October, 2006, to execute any such permit applications, reports, and other documents on behalf of ExxonMobil Chemical Company Baton Rouge Plastics Plant.

Signature

APPENDIX Q

GROUNDWATER MONITORING PLAN

EXXONMOBIL CHEMICAL COMPANY
BATON ROUGE PLASTICS PLANT
BATON ROUGE, LOUISIANA

AGENCY INTEREST NO. 285
FACILITY ID NO. GD-033-1788
PERMIT NO. P-0150

Groundwater Sampling and Analysis Plan for Industrial Solid Waste Surface Impoundments

February 2007

Prepared By:

Eagle Environmental Services, Inc.
18369 Petroleum Drive
Baton Rouge, Louisiana 70809
(225) 757-0870

Eagle Project No. 13-0101

TABLE OF CONTENTS

Exhibits

1.0 INTRODUCTION

This document describes the Groundwater Sampling and Analysis Plan designed to monitor the impact of ExxonMobil Chemical Company Baton Rouge Plastics Plant's (BRPP's) surface impoundments on the groundwater in the uppermost aquifer underlying the facility, as required in LAC 33:VII.521.F.5.c and e, as well as LAC 33:VII.709.E.2, 3, and 4. This plan describes the consistent sampling and analysis procedures which will be implemented to ensure that results from detection monitoring sampling events are representative of groundwater quality at the background and downgradient monitoring well locations. BRPP operates three surface impoundments that include the North Pond, the South Pond, and the Equalization Pond. The Groundwater Sampling and Analysis Plan also describes the procedures to detect, report, and verify changes in the groundwater quality.

2.0 GROUNDWATER MONITORING DETECTION SYSTEM

Groundwater quality is monitored in the immediate vicinity of the surface impoundments by five monitoring wells. These monitoring wells are constructed with their screened intervals within the uppermost aquifer at a depth of approximately 20 to 30 feet below ground surface.

An under-drain de-watering system is maintained for the North and South Ponds. To ensure the protection of groundwater beneath the units, BRPP will note the operation of the under-drain systems in each semi-annual report. The locations of the under-drain sample ports are shown in the figure included as Exhibit 1.

BRPP will collect groundwater samples from the uppermost aquifer wells and under-drain system for analysis of site-specific parameters. The designated background wells are monitoring wells MW-10 and MW-14, which are located along the eastern side of the surface impoundments and in an area which has historically been hydraulically upgradient of the facility. Monitoring wells MW-11, MW-12A, and MW-13 are designated as downgradient monitoring wells. The location of these monitoring wells are shown in Exhibit 1.

3.0 DETECTION MONITORING PARAMETERS

As required by LAC 33:VII.709.E.3.g, the parameters selected by BRPP during detection monitoring are indicative of reaction products of the waste disposed in the surface impoundments. The detection monitoring parameters are:

- pH;
- specific conductance;
- hexane;
- iso-octane;
- benzene;
- vinyl acetate;
- total petroleum hydrocarbons, oil range organics (TPH-ORO);
- total petroleum hydrocarbons, gasoline range organics (TPH-GRO);
- total petroleum hydrocarbons, diesel range organics (TPH-DRO); and
- naphthalene.

These parameters were selected to provide a reliable indication of the presence of contaminants in the groundwater underlying the surface impoundments. The parameters hexane, iso-octane, benzene, vinyl acetate, TPH-ORO, TPH-GRO, and TPH-DRO were selected based on products stored in bulk at the facility, as well as their physical characteristics (i.e., liquid vs. gas). Hexane is used at the facility as a modifier/solvent throughout the plant and is stored in bulk. Iso-octane is used as an initiator diluent throughout the plant and is stored in bulk. Vinyl acetate is a co-monomer used throughout BRPP and is stored in bulk at the plant.

4.0 SAMPLING AND ANALYSIS FREQUENCY

This sampling and analysis plan explains procedures and techniques for:

- sample collection which ensures that collected samples are representative of the zone being monitored and which prevents cross-contamination of or tampering with samples;

- sample preservation and shipment which ensures the integrity and reliability of the sample collected for analysis; and

- chain-of-custody control.

The initial sampling for detection monitoring will occur after receipt of LDEQ approval of this Groundwater Sampling and Analysis Plan. The initial sampling will include a minimum of four independent samples collected from each well for analysis of the detection monitoring parameters. The four minimum independent sampling events will be conducted at least quarterly to reflect seasonal variations in groundwater quality. The sampling events

may be increased to a number greater than four for statistical analysis requirements. The initial sampling event will be initiated following approval from LDEQ.

Sampling and analysis of BRPP's groundwater monitoring system will be conducted every 6 months for the life of the surface impoundments as required by LAC 33:VII.709.E.3.c and d. LAC 33:VII.709.E.3.d also requires detection monitoring for the period of post-closure care.

The Groundwater Sampling and Analysis Plan provides for a step-by-step fashion to collect groundwater samples. This plan provides sample collection procedures that ensure that collected samples are representative of the zone being monitored and prevent cross-contamination of or tampering with the samples. A general overview of sampling procedures is included below.

4.1 Monitoring Well Groundwater Sample Collection Procedures

4.1.1 Monitoring Well Sample Collection Preparation

To ensure that sample collection produces samples representative of the zone monitored and to prevent cross-contamination of or tampering with the samples, the facility thoroughly prepares prior to sampling events. In preparation of any sample collection activities, a review is made to confirm that all necessary sampling equipment and supplies will be available at the sampling site. In addition, a review of the Detection Monitoring Parameter Specifications (Exhibit 2) is done to determine if any chemical preservatives are needed for the sample containers.

4.1.2 Monitoring Well Purging

The following list of equipment may be used for well purging:

- Dedicated or disposable hand bailer
- Hand pump with associated piping
- Positive gas displacement (bladder) pump with air supply and discharge hose
- Centrifugal lift pump and suction hose, or other comparable purging equipment
- Positive electric displacement pump with electric supply and discharge hose
- Peristaltic pump and suction hose, or other comparable purging equipment
- Surgical laboratory gloves
- Water level indicator (accuracy 0.01 feet)
- Watch
- Five-gallon containers

- Deionized water
- Liquinox, Alconox or other non-phosphate detergent
- Polyethylene rope
- Clean paper towels

The following outlines the procedures used to purge the monitoring wells.

1. Prior to well purging activities, the static water level (DTW) in each well will be determined below the top of casing (TOC) using a water level indicator or weighted tape. The DTW will be recorded on the groundwater collection report form to the nearest 0.01 foot. A sample groundwater collection report form is included as Exhibit 3.

2. Using the water level indicator or weighted tape, the total depth to the bottom of the well (TD) will be determined. The TD will be recorded on the groundwater collection report form. Replicate measurements will be taken to ensure reproducible results. This measurement will be converted to a water elevation in feet above National Geodetic Vertical Datum (NGVD) from the surveyed elevation of the top casing. The data will be recorded on a groundwater sampling data form with the date, time, monitoring well number, depth to water, and the name of the person recording the data. The water level indicator or weighted tape will be cleaned between each well, washing with Liquinox or Alconox or other non-phosphorous detergent and then rinsing with liberal amounts of deionized water. It will then be dried with clean paper towels.

   If silt is detected in the base of well, this data will be recorded in the field notes. If at least 10% of a well's screen is blocked due to the settling of solids within the well, the well will be redeveloped prior to the next sampling event.

3. The volume of water to be purged from the well (V_p) will be calculated using the following formula:

   $V_p = 3\ (TD - DTW)\ (\pi\ r^2)\ (c)$; where

   V_p = volume to be purged (gallons)
   TD = total depth of well (feet)
   DTW = depth to water from top of casing (feet)
   π = 3.14
   r^2 = radius of well squared (feet)
   c = constant, 7.481 gallons per foot squared

Note: If the well is evacuated to dryness, no additional purging will be necessary.

4. Wells will be purged by either pumping or bailing with dedicated bailers. If purging is performed by pumping, the pump intake will be placed near the bottom of the well and pumping will begin. If a pump is used, the flow rate will be determined by measuring the volume of water discharged (Q) each minute over a 3- minute time interval. The required pumping time will be calculated to obtain Vp and the required time for pump shut-off will be documented. The pump will be allowed to operate for the required time interval unless the well is evacuated to dryness (as indicated by a Q of less than 0.1 gpm). If purging is performed by a hand pump, the pump will be operated until the required Vp has been removed or to dryness, whichever occurs first.

   If the dedicated bailer is used, it will be rinsed with liberal amounts of deionized water. After cleaning, the bailer will be lowered into the water using clean, new polypropylene rope. Bailing will continue until the required Vp has been removed or to dryness, whichever occurs first. The polyethylene rope will be discarded when purging is completed.

5. Upon completion of purging, the pump will be removed from the well, the pump shall be placed in a container filled with a non-phosphate detergent such as Liquinox or Alconox and allowed to run for several minutes in order to flush any residual purge water from the pump. The pump will then be placed in a container filled with deionized water and again allowed to run for several minutes to remove all detergent water from the pump. In addition, all exterior wetted parts will be washed with liberal amounts of deionized water. The pumping time and the calculated volume removed will be recorded on the well purging data sheets. Any odors, colors, etc. that are observed during pumping or bailing will be noted on the field notes.

4.1.3 Monitoring Well Groundwater Sample Collection

The following equipment will be required for well sampling:

- Portable pH meter (with calibration solutions)
- Portable specific conductance meter (with calibration solutions)
- Portable temperature meter
- Ice chests (with ice)
- Groundwater collection sheets (field book)

- Chain-of-custody sheets
- Surgical laboratory gloves
- Water level indicator (accuracy 0.01 feet)
- Sample bottles from laboratory
- Sample bottle labels with waterproof pen
- Watch
- 5-gallon containers
- Deionized water
- Liquinox, Alconox or other non-phosphate detergent
- Polyethylene rope
- Clean paper towels

The procedures for sampling monitoring wells are outlined in the following paragraphs. The procedures are to be used after the well has been purged and sufficiently recharged to collect the required sample quantities. Sample bottles with appropriate preservatives will be furnished by an independent analytical laboratory.

1. New surgical/lab gloves will be put on for each sampling location.

2. Sampling equipment, bottles, and logging information will be laid out and arranged.

3. Labels on sample containers, groundwater collections report sheets and chain-of-custody forms will be checked to see that they are consistent with the well number being sampled. All collection bottles will be pre-washed by the laboratory in accordance with the EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories, 1979. Water-resistant markers will be used to label the sample bottles, and the container label will be checked for proper markings.

4. Samples will be collected using a dedicated or disposable bailer for each well. The bailer will be rinsed by slowly lowering the bailer into the well and allowing water to fill the bailer, retrieving the bailer, and then pouring the water into a bucket or plastic tub.

5. Samples will be collected by slowly lowering the bailer into the water, allowing it to fill. Care will be taken to avoid excessively agitating water in the well with bailer. When the bailer is full, the bailer will be carefully removed and the water will be carefully poured into the analytical sample bottles. No dirt or dust will be allowed to blow into the bottles or bottle caps.

6. A portion of the first bailer sample will be used for immediate measurement of the field parameters pH, temperature and specific conductance. The water will be poured into a separate jar and three separate measurements will be made (see Section 4.1.4 for Field Measurement procedures) to determine the parameter reading. Because of the importance of doing so, the field instruments will be calibrated prior to sample collection activities, and then after completion of sampling activities. All calibration records will be documented in the field logbook.

7. The samples will be carefully packed in ice chests or coolers packed with ice or freezer packs as soon after collection as possible. To minimize possible leakage, samples and ice will be arranged so that the sample containers will not make contact during shipment.

8. The chain-of-custody transfer record will be completed for the sample. An example chain-of-custody transfer form is included in Exhibit 4.

9. The samples will be transported with the chain-of-custody form(s) to an independent analytical laboratory. The chain-of-custody form(s) will be enclosed in a water proof bag. Samples will be transported the same day they are collected, if possible.

Notes: Sample bottles will not be overfilled with holding preservatives.

While filling and once the sample is in the bottle, nothing will be allowed to touch the bottle opening or the sample inside. Nothing will ever be stuck into the sample.

To the extent practicable, samples will be kept out of direct sunlight.

Samples will be collected in the order of extractable organics and then inorganics.

4.1.4 Field Measurements

All field measurements and comments will be recorded on the Groundwater Sampling Collection Report Form. Field measurements of pH, specific conductance, and temperature will be taken and recorded on the Groundwater Sampling Collection Report Form. The instruments will be properly calibrated and calibration data will be recorded in the field logbook. Calibrations will be done in accordance with the manufacturer's recommendations. If any procedures are not performed as prescribed by the

manufacturer, the reason will be stated on the field notes. The appearance of the water purged from the well will also be noted.

4.1.5 Well Maintenance and Post-Collection Procedures

During sampling events, wells will be inspected for signs of tampering, damage, corrosion, faulty locking devices, etc. Any areas of concern will be noted in the field log book and promptly corrected. If at least 10% of a well's screen is blocked due to the settling of solids within the well, the well will be redeveloped prior to the next sampling event. Following completion of field activities, the following will be performed.

1. All monitoring well locks will be relocked.
2. All field equipment will be thoroughly cleaned.
3. Broken or damaged equipment will be reported.

4.2 Sample Preservation, Shipment, and Chain-of-Custody Control

This section provides procedures for sample preservation, shipment, and chain-of-custody control which ensure the integrity and reliability of the samples collected for analysis.

4.2.1 Sample Preservation

Samples collected will be immediately preserved in the field by placing them in an insulated ice chest containing ice and chilling them to temperatures at or below 4°C. Sample bottles provided by an independent analytical laboratory will be prepared with the proper preservatives, if necessary.

4.2.2 Sample Shipment

Prior to shipment, the following will be checked.

1. Sample bottles will be double-checked for leaks, cracks, proper labeling, and sufficient preservative (ice).

2. The chain-of-custody will be completed accurately. The samples will then be logged by the sampler on the Chain-of-Custody Form and the samples will then be transported, with as few transfers as possible, immediately to the independent analytical laboratory. The laboratory will be informed that the samples will be arriving.

3. If field personnel make direct delivery of the samples to the laboratory, the samples will be rechecked for breakage or leakage that may have occurred during transport. Samples will then be signed over to

laboratory personnel according to chain-of-custody procedures. No samples will be accepted that are not properly labeled and sealed. Upon receipt, the authorized laboratory personnel will store and/or prepare the samples for analysis, taking into consideration sample holding times for the parameters for which the sample will be analyzed.

4.2.3 Chain-of-Custody Control

Documentation of responsibility for the samples collected is provided by completing the Chain-of-Custody Form. The Chain-of-Custody Form will be initiated in the field at the time of sample collection. The original will accompany the samples through independent analytical laboratory analysis, with copies retained at any intermediate step.

Upon completion of the analysis, the custodian responsible for the analysis will complete the Chain-of-Custody Form, file a copy, and send a copy to the appropriate BRPP representative along with the analytical results.

5.0 ANALYTICAL PROCEDURES

Groundwater monitoring samples are analyzed using laboratory methods which conform to test methods outlined in the most recent approved editions of U.S. EPA *Test Methods for Evaluating Solid Waste* (SW-846), *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020), or *Standard Methods for the Examination of Water and Wastewater*. The test method, method detection limit, and practical quantitation limit for each parameter monitored are provided in Exhibit 2 (Detection Monitoring Parameter Specifications).

6.0 GROUNDWATER DATA EVALUATION

In accordance with LDEQ's Groundwater Regulatory Interpretation Document (GRID) dated September 9, 1994, the statistical method(s) proposed by the facility for evaluation of groundwater quality data will be submitted to LDEQ as a permit modification within 90 days after completion of the initial sampling event.

7.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

7.1 Field Quality Control

Field quality control measures, as described earlier in this document, are proven procedures for collecting representative samples, calibrating field testing equipment, preserving samples for analysis, and documenting chain-of-custody. These measures contribute to sampling events' producing monitoring results that are reliable indications of groundwater quality.

7.1.1 Field Blank

A field blank will be collected to determine potential absorption of volatile organics from the air into a sample. At the sampling site, a container received from the laboratory will be filled with deionized water without using any intermediary tubes or vessels. The field blank will be labeled with a unique identification number and standard chain-of-custody procedures will be followed. The field blank will be subjected to the same laboratory analysis as the samples. The concentration levels of any contaminant found in the field blank will be noted and compared to sample results.

7.1.2 Rinsate Blank

The rinsate (field equipment) blank was collected to detect and quantify potential chemical artifacts originating from sampling activities. The rinsate blank was produced in the field by rinsing the sampling equipment with analyte-free water and collecting the rinsate in appropriate sample containers. The sample was submitted to the laboratory for the same analysis for the entire listing of COCs. The concentration levels of site-specific parameters detected in the rinsate blank were noted and compared to sample results.

7.1.3 Trip Blank

A trip blank is furnished by the contract laboratory to detect and quantify potential chemical artifacts originating from sample containers, deionized water, or laboratory handling procedures. The trip blank is produced by the laboratory by filling two containers with deionized water in the laboratory prior to transport to the field. It then follows the same procedures as the field blank, and, upon return to the laboratory, is subjected to the same laboratory analysis as the samples. The concentration levels of any contaminant found in the trip blank will be noted and compared to sample results.

7.2 Laboratory Quality Control

BRPP will submit its groundwater samples to a qualified independent laboratory which performs testing according to documented and approved procedures by trained personnel using calibrated equipment. QA/QC procedures, including field blanks, laboratory spikes and blanks, precision accuracy of analyses, and detection limits will conform to those specified in SW-846.

8.0 REPORTING AND RECORDKEEPING

Within 90 days after completion of field activities for each detection monitoring sampling event, BRPP will submit to LDEQ four bound copies (8½ by 11 inches) of a report that includes:

- Analytical results of groundwater samples;
- Documentation of the chain-of-custody of sampling and analyses;
- A scaled potentiometric surface map showing monitoring well locations, groundwater elevations with respect to mean sea level or equivalent for the stratum monitored;
- An isopleth map for each monitoring well of all detection monitoring parameters, or plots of each monitoring well by concentration of parameters versus time; and
- A statement of whether a statistically significant difference in concentration over background concentrations is detected.

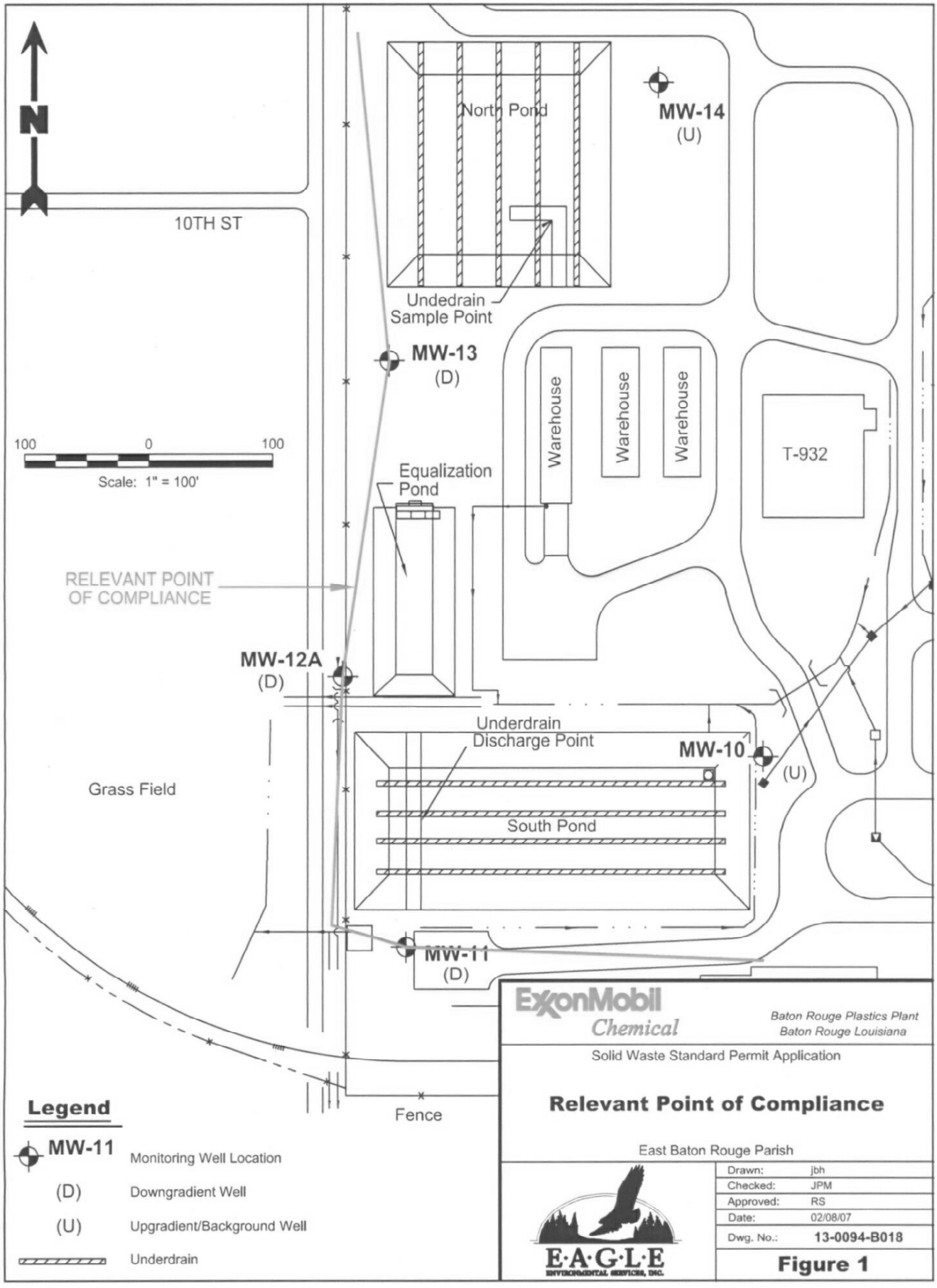
BRPP will maintain on site copies of each report for the life of the facility, as well as the duration of the post-closure care period, as required in LAC 33:VII.711.C.1.b.

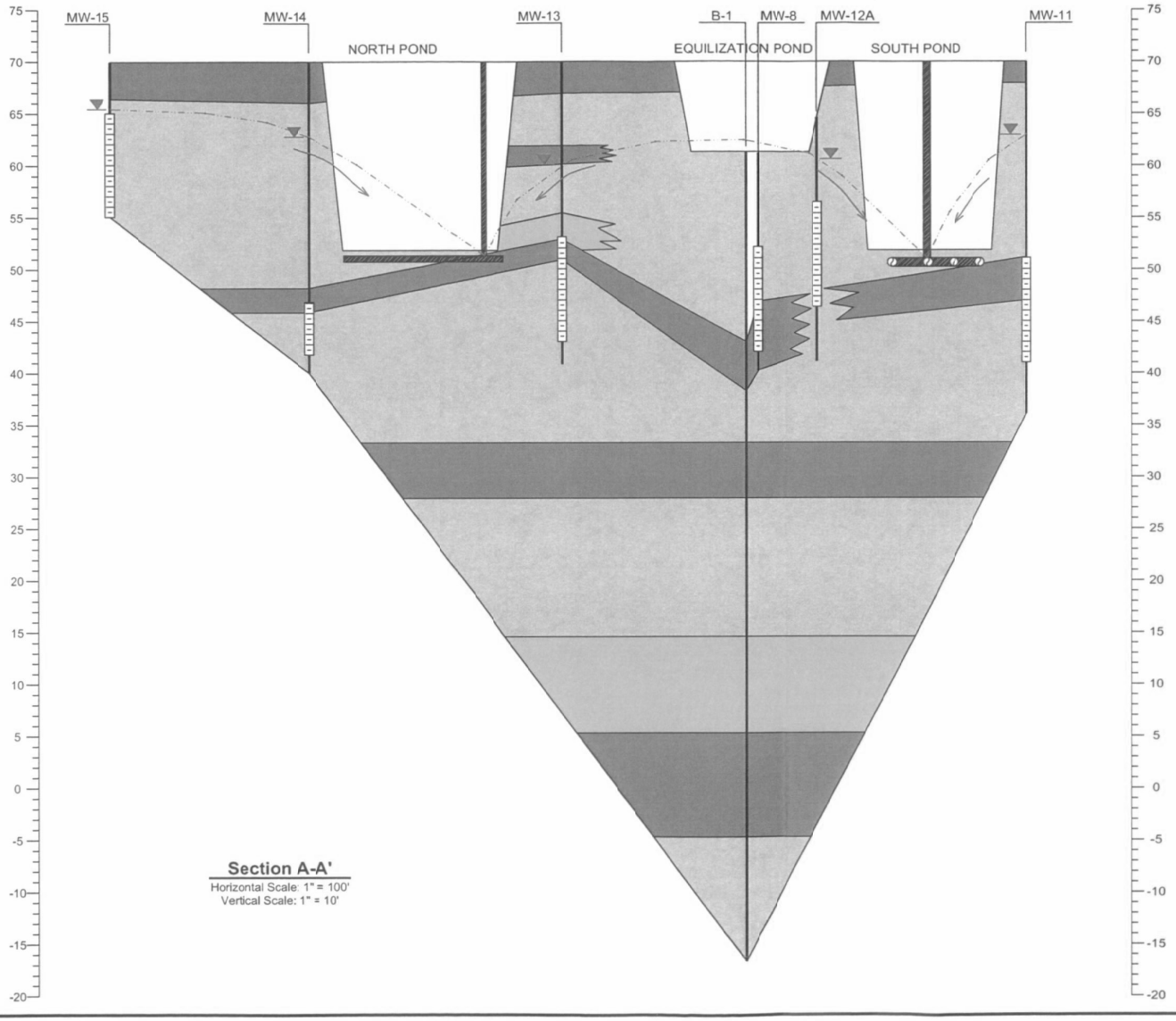
LIST OF EXHIBITS

EXHIBIT 1

FIGURE 1 RELEVANT POINT OF COMPLIANCE

FIGURE 2 HYDROGEOLOGIC SECTION OF SOLID WASTE IMPOUNDMENTS


N
10TH ST
North Pond
MW-14
(U)
Undedrain
Sample Point
MW-13
(D)
Warehouse
Warehouse
Warehouse
T-932
100
0
100
Scale: 1" = 100'
Equalization
Pond
RELEVANT POINT
OF COMPLIANCE
MW-12A
(D)
Underdrain
Discharge Point
MW-10
(U)
Grass Field
South Pond
MW-11
(D)
Fence
Legend
MW-11
Monitoring Well Location
(D)
Downgradient Well
(U)
Upgradient/Background Well
Underdrain
ExxonMobil
Chemical
Baton Rouge Plastics Plant
Baton Rouge Louisiana
Solid Waste Standard Permit Application
Relevant Point of Compliance
East Baton Rouge Parish
E·A·G·L·E
ENVIRONMENTAL SERVICES, INC.
Drawn: jbh
Checked: JPM
Approved: RS
Date: 02/08/07
Dwg. No.: 13-0094-B018
Figure 1



Section A-A'
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'

Legend

- Clay
- Silty Clay / Clayed Silt
- Clayey Sand / Silty Sandy Clay / Silty Clayey Sand
- Screen Interval
- Potentiometric Surface Elevation (Feb. 5, 2007)
- Underdrain

Note:

Except at boring locations, ground surface and boundaries between soil layers are inferred.

Five laterals are constructed for North Pond; oriented west to east.

Four laterals are constructed for South Pond; oriented north to south.

ExxonMobil Chemical
Baton Rouge Plastics Plant
Baton Rouge, Louisiana

Solid Waste Standard Permit Application

Hydrogeologic Section
Industrial Solid Waste Impoundments

East Baton Rouge Parish

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

Drawn:	jbh
Checked:	RS
Approved:	RS
Date:	02/05/07
Dwg. No.:	13-0094-B017

Figure 2

EXHIBIT 2

DETECTION MONITORING PARAMETER SPECIFICATIONS

Detection Monitoring Parameter Specifications

PARAMETER	CONTAINER[1]	PRESERVATION METHOD	MAXIMUM HOLDING TIME	ANALYTICAL METHOD	METHOD DETECTION LIMIT	PRACTICAL QUANTITATION LIMIT
pH	P, G	Cool to 4°C	Immed.	150.1[3]	0.01 s.u.	0.1 s.u.
Specific Conductance	P, G	Cool to 4°C	Immed.	120.1[3]	0.01 µmhos/cm	0.1 µmhos/cm
TPH-GRO	G	Cool to 4°C HCl to pH <2	14 days	8015[3]	0.1 mg/L	0.1 mg/L
TPH-DRO	G	Cool to 4°C	7 days	8015[3]	0.1 mg/L	0.1 mg/L
TPH-ORO	G	Cool to 4°C	7 days	8015[3]	0.1 mg/L	0.1 mg/L
Hexane	G	Cool to 4°C HCl to pH <2	14 days	8260[2]	1 µg/L	5 µg/L
Iso-Octane	G	Cool to 4°C HCl to pH <2	14 days	8260[2]	1 µg/L	5 µg/L
Naphthalene	G	Cool to 4°C HCl to pH<2	14 days	8260[2]	0.5 µg/L	5 µg/L
Benzene	G	Cool to 4°C HCl to pH <2	14 days	8260[2]	0.5 µg/L	5 µg/L
Vinyl Acetate	G	Cool to 4°C HCl to pH <2	14 days	8260[2]	0.5 µg/L	5 µg/L

[1] G=Glass.
[2] Test Methods for Evaluating Solid Waste, Third Edition, SW-846.
[3] Standard Methods for the Examination of Water and Wastewater, 17th Edition.

EXHIBIT 3

GROUNDWATER SAMPLING DATA FORM

GROUNDWATER SAMPLING DATA FORM

Facility Name: _____ Location: _____
Collector: _____ Well No.: _____

PURGING INFORMATION

Date/Time: _____ Method of Purging: _____
Elevation Top of Casing: _____ (feet)
Depth to Water (DTW): _____ (feet)
Water Elevation: _____ (feet)
Total Depth of Well: _____ (feet)
Well Diameter: _____ (feet) [Note: 1 inch = 0.083 feet]
Well Radius (r): _____ (feet) [Note: r = diameter/2]
Gallons Per Well Volume: _____
Total Gallons to Purge (VP): _____ Total Gallons Purged: _____

$VP = 3 (TD - DTW) (\pi r^2) (c)$ [Note: $\pi = 3.14$]
[Note: c = constant, 7.481 gallons per foot squared]

FIELD MEASUREMENTS

Well Volume #1 Temp.: _____ pH: _____ Conductivity: _____ ORP: _____
Well Volume #2 Temp.: _____ pH: _____ Conductivity: _____ ORP: _____
Well Volume #3 Temp.: _____ pH: _____ Conductivity: _____ ORP: _____
Instrument(s) Used: _____

SAMPLING INFORMATION

Date/Time: _____ Method of Sampling: _____
Sample Designation: _____
Duplicate Sample Designation (if applicable): _____
Sample Type: ( ) Grab ( ) Composite ( ) Other:

Parameter(s)	Analytical Method	Preservatives	Containers

Weather Conditions at Time of Sampling: _____
Sample Appearance: _____ Sample Odor: _____

Sampling Personnel

_____ Date _____
(Signed)

Eagle Environmental Services, Inc.

EXHIBIT 4

CHAIN-OF-CUSTODY FORM

CHAIN OF CUSTODY & ANALYTICAL REQUEST RECORD

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.
18369 PETROLEUM DRIVE, BATON ROUGE, LA 70809-6124
PHONE: 225-757-0870 FAX: 225-757-8855

E·A·G·L·E ENVIRONMENTAL SERVICES, INC.

CLIENT: _____ PROJECT #: _____ DATE: _____

SAMPLED BY: _____ LABORATORY: _____ CONTACT: _____

SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	NO. OF CONTAINERS	PRESERVATIVE	ANALYSES AND INSTRUCTIONS

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
COLLECTION WITNESS: (SIGNATURE IF REQUIRED)	DATE	TIME	METHOD OF SHIPMENT:		TIME
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME

APPENDIX R

POND SLUDGE ANALYTICAL DATA

Randal Myers, Ph. D.
Laboratory Manager

Terry Wilks
Vice President-Technical

DYNATECH ENVIRONMENTAL LABORATORIES

Analytical Environmental Services

June 15, 1992

To: Exxon Chemicals
P.O. Box 1607
Baton Rouge, LA 70821
Attn: Don Holloway

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

Sample I.D. AA10788 Purchase order number: EP 26054
Location code: EXXON Client Sample ID: NORTH POND SLUDGE
Sample collector: CLIENT Sample collection date: 05/28/92
Laboratory submittal date: 05/28/92 Time: 13:07
Received by: TRB Validated by: TRB

Parameter: TCLP BASE/NEUTRAL/ACID
Method reference: EPA 604
Result: see appended report
Date started: 06/10/92 Date finished: 06/10/92
Time started: 13:57 Analyst: GEK

Parameter: TCLP Metals (for solid samples)
Method reference: SW 846 6010
Result: see appended report
Date started: 06/01/92 Date finished: 06/02/92
Time started: 17:09 Analyst: CFS

Parameter: TCLPVOA
Method reference: EPA1311/8240
Result: see appended report
Date started: 06/07/92 Date finished: 06/07/92
Time started: 14:18 Analyst: GEK

Data for TCLP Metals (for solid samples) mg/L:

Component Name	Concentration	Component MDL
Arsenic	<5.0	5.0
Barium	<100.0	100.0
Cadmium	<1.0	1.0

Sample I.D. AA10788 (continued)

Data for TCLP Metals (for solid samples) (continued):

Component Name	Concentration	Component MDL
Chromium	<5.0	5.0
Lead	<5.0	5.0
Mercury	<0.2	0.2
Selenium	<1.0	1.0
Silver	<5.0	5.0

Data for TCLPVOA mg/L:

Component Name	Concentration	Component MDL
Benzene	Less than MDL	5.0
Carbon Tetrachloride	Less than MDL	5.0
Chlorobenzene	Less than MDL	100.0
Chloroform	Less than MDL	6.0
1,2-Dichloroethane	Less than MDL	0.5
1,4-Dichlorobenzene	Less than MDL	7.5
1,1-Dichloroethylene	Less than MDL	0.7
Methyl ethyl ketone	Less than MDL	200.0
Tetrachloroethylene	Less than MDL	0.7
Trichloroethylene	Less than MDL	7.5
Vinyl chloride	Less than MDL	0.2
SURROGATE RECOVERIES		
%1-2-Dichloroethane	96%	
%D8-Toluene	99%	
%Bromofluorobenzene	97%	

Data for TCLP BASE/NEUTRAL/ACID ug/L:

Component Name	Concentration	Component MDL
2-Methylphenol (O-Cresol)	Less than MDL	200.0
3-Methylphenol (M-Cresol)	Less than MDL	200.0
4-Methylphenol (P-Cresol)	Less than MDL	200.0
Cresol (Total)	Less than MDL	200.0
2,4-Dinitrotoluene	Less than MDL	0.13
Hexachlorobenzene	Less than MDL	0.13
Hexachlorobutadiene	Less than MDL	0.5
Hexachloroethane	Less than MDL	3.0
Nitrobenzene	Less than MDL	2.0
Pentachlorophenol	Less than MDL	100.0
Pyridine	Less than MDL	5.0
2,4,5-Trichlorophenol	Less than MDL	400.0
2,4,6-Trichlorophenol	Less than MDL	2.0

Sample I.D. AA10788 (continued)

Data for TCLP BASE/NEUTRAL/ACID (continued):

Component Name	Concentration	Component MDL
SURROGATE RECOVERIES		
%2-Fluorophenol	33%	
%Phenol-d5	36%	
%Nitrobenzene-d5	41%	
%2-Fluorobiphenyl	43%	
%2,4,6-Tribromophenol	78%	
%Terphenyl-d14	53%	

If there are any questions regarding this data, please call.

Randal B. Myers

Randal Myers, Ph. D.
Laboratory Manager

Terry Wilks
Vice President-Technical

DYNATECH ENVIRONMENTAL LABORATORIES

Analytical Environmental Services

April 21, 1992

To: Exxon Chemicals
P.O. Box 1607
Baton Rouge, LA 70821
Attn: Don Holloway

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

WCD#AA37204

Sample I.D. AA09732 Purchase order number: EP 26054
Location code: EXXON Client Sample ID: SOUTH POND SLUDGE SP-C
Sample collector: LEE MCNABB Sample collection date: 04/01/92
Laboratory submittal date: 04/01/92 Time: 14:19
Received by: TRB Validated by: TRB

Parameter: TCLP BASE/NEUTRAL/ACID
Method reference: EPA 604
Result: see appended report
Date started: 04/15/92 Date finished: 04/15/92
Time started: 12:34 Analyst: GEK

Parameter: TCLPVOA
Method reference: EPA1311/8240
Result: see appended report
Date started: 04/13/92 Date finished: 04/13/92
Time started: 12:44 Analyst: GEK

Parameter: TCLP Metals (for water samples)
Method reference: SW 846 6010
Result: see appended report
Date started: 04/09/92 Date finished: 04/09/92
Time started: 10:54 Analyst: CFS

Data for TCLP Metals (for water samples) mg/L:

Component Name	Concentration	Component MDL
Arsenic	Less than MDL	5
Barium	Less than MDL	100
Cadmium	Less than MDL	1

Exxon Chemicals
Page: 2
April 21, 1992

Sample I.D. AA09732 (continued)

Data for TCLP Metals (for water samples) (continued):

Component Name	Concentration	Component MDL
Chromium	Less than MDL	1
Lead	Less than MDL	1
Mercury	Less than MDL	0.2
Selenium	Less than MDL	1
Silver	Less than MDL	5

Data for TCLPVOA mg/L:

Component Name	Concentration	Component MDL
Benzene	Less than MDL	5.0
Carbon Tetrachloride	Less than MDL	5.0
Chlorobenzene	Less than MDL	100.0
Chloroform	Less than MDL	6.0
1,2-Dichloroethane	Less than MDL	0.5
1,4-Dichlorobenzene	Less than MDL	7.5
1,1-Dichloroethylene	Less than MDL	0.7
Methyl ethyl ketone	Less than MDL	200.0
Tetrachloroethylene	Less than MDL	0.7
Trichloroethylene	Less than MDL	7.5
Vinyl chloride	Less than MDL	0.2
SURROGATE RECOVERIES		
%1-2-Dichloroethane	99%	
%D8-Toluene	99%	
%Bromofluorobenzene	102%	

Data for TCLP BASE/NEUTRAL/ACID ug/L:

Component Name	Concentration	Component MDL
2-Methylphenol (O-Cresol)	Less than MDL	200.0
3-Methylphenol (M-Cresol)	Less than MDL	200.0
4-Methylphenol (P-Cresol)	Less than MDL	200.0
Cresol (Total)	Less than MDL	200.0
2,4-Dinitrotoluene	Less than MDL	0.13
Hexachlorobenzene	Less than MDL	0.13
Hexachlorobutadiene	Less than MDL	0.5
Hexachloroethane	Less than MDL	3.0
Nitrobenzene	Less than MDL	2.0
Pentachlorophenol	Less than MDL	100.0
Pyridine	Less than MDL	5.0
2,4,5-Trichlorophenol	Less than MDL	400.0
2,4,6-Trichlorophenol	Less than MDL	2.0

Sample I.D. AA09732 (continued)

Data for TCLP BASE/NEUTRAL/ACID (continued):

Component Name	Concentration	Component MDL
SURROGATE RECOVERIES		
%2-Fluorophenol	35%	
%Phenol-d5	35%	
%Nitrobenzene-d5	51%	
%2-Fluorobiphenyl	38%	
%2,4,6-Tribromophenol	83%	
%Terphenyl-d14	90%	

If there are any questions regarding this data, please call.

Randal B. Myers

Randal Myers, Ph. D.
Laboratory Manager

Terry Wilks
Vice President-Technical

DYNATECH ENVIRONMENTAL LABORATORIES

Analytical Environmental Services

June 15, 1992

To: Exxon Chemicals
P.O. Box 1607
Baton Rouge, LA 70821
Attn: Don Holloway

The following analytical results have been obtained for the indicated sample which was submitted to this laboratory:

Sample I.D. AA10789 Purchase order number: EP 26054
Location code: EXXON
Client Sample ID: EQUALIZATION POND SLUDGE
Sample collector: CLIENT Sample collection date: 05/28/92
Laboratory submittal date: 05/28/92 Time: 13:07
Received by: TRB Validated by: TRB

Parameter: TCLP BASE/NEUTRAL/ACID
Method reference: EPA 604
Result: see appended report
Date started: 06/10/92 Date finished: 06/10/92
Time started: 14:55 Analyst: GEK

Parameter: TCLP Metals (for solid samples)
Method reference: SW 846 6010
Result: see appended report
Date started: 06/01/92 Date finished: 06/02/92
Time started: 17:09 Analyst: CFS

Parameter: TCLPVOA
Method reference: EPA1311/8240
Result: see appended report
Date started: 06/07/92 Date finished: 06/07/92
Time started: 15:09 Analyst: GEK

Data for TCLP Metals (for solid samples) mg/L:

Component Name	Concentration	Component MDL
Arsenic	<5.0	5.0
Barium	<100.0	100.0

Sample I.D. AA10789 (continued)

Data for TCLP Metals (for solid samples) (continued):

Component Name	Concentration	Component MDL
Cadmium	<1.0	1.0
Chromium	<5.0	5.0
Lead	<5.0	5.0
Mercury	<0.2	0.2
Selenium	<1.0	1.0
Silver	<5.0	5.0

Data for TCLPVOA mg/L:

Component Name	Concentration	Component MDL
Benzene	Less than MDL	5.0
Carbon Tetrachloride	Less than MDL	5.0
Chlorobenzene	Less than MDL	100.0
Chloroform	Less than MDL	6.0
1,2-Dichloroethane	Less than MDL	0.5
1,4-Dichlorobenzene	Less than MDL	7.5
1,1-Dichloroethylene	Less than MDL	0.7
Methyl ethyl ketone	Less than MDL	200.0
Tetrachloroethylene	Less than MDL	0.7
Trichloroethylene	Less than MDL	7.5
Vinyl chloride	Less than MDL	0.2
SURROGATE RECOVERIES		
%1-2-Dichloroethane	98%	
%D8-Toluene	98%	
%Bromofluorobenzene	95%	

Data for TCLP BASE/NEUTRAL/ACID ug/L:

Component Name	Concentration	Component MDL
2-Methylphenol (O-Cresol)	Less than MDL	200.0
3-Methylphenol (M-Cresol)	Less than MDL	200.0
4-Methylphenol (P-Cresol)	Less than MDL	200.0
Cresol (Total)	Less than MDL	200.0
2,4-Dinitrotoluene	Less than MDL	0.13
Hexachlorobenzene	Less than MDL	0.13
Hexachlorobutadiene	Less than MDL	0.5
Hexachloroethane	Less than MDL	3.0
Nitrobenzene	Less than MDL	2.0
Pentachlorophenol	Less than MDL	100.0
Pyridine	Less than MDL	5.0
2,4,5-Trichlorophenol	Less than MDL	400.0

Sample I.D. AA10789 (continued)

Data for TCLP BASE/NEUTRAL/ACID (continued):

Component Name	Concentration	Component MDL
2,4,6-Trichlorophenol	Less than MDL	2.0
SURROGATE RECOVERIES		
%2-Fluorophenol	32%	
%Phenol-d5	26%	
%Nitrobenzene-d5	30%	
%2-Fluorobiphenyl	28%	
%2,4,6-Tribromophenol	58%	
%Terphenyl-d14	92%	

If there are any questions regarding this data, please call.

Randal B. Myers

BFI Waste Systems™
BROWNING-FERRIS INDUSTRIES
Colonial Landfill District

June 8, 1992

Mr. Lee McNabb
Exxon Chemical Co. Plastic Division
11675 Scotlandville Highway
Baton Rouge, LA 70807

RE: Waste Water Pond Sludge & Liner
BFI Waste Code Number
LA 620/930527/84860

Dear Mr. McNabb:

BFI Colonial Landfill would like to thank you for the opportunity to serve you at Exxon Chemical Company Plastic Division.

The Waste Water Pond Sludge and Liner waste stream that was submitted for disposal has been approved for disposal at BFI Colonial Landfill in Sorrento, LA. Before you ship this waste stream please notify us 24 hours in advance so we will have time to schedule the waste to be accepted. Also, if this material is shipped in drums please place them on pallets for us to off load them.

The Lab approval fee for the above mentioned waste stream is $85.00.

Thank you again for your cooperation and consideration in BFI Colonial Landfill.

Sincerely,

Larry M. Lawrence

Larry M. Lawrence
BROWNING-FERRIS INDUSTRIES
Senior Account Manager

LML/mf

Waste Systems
BROWNING-FERRIS INDUSTRIES
BROWNING-FERRIS INDUSTRIES HOUSTON LAB

MAY 05 1992

LDEQ No: AA 37204
LA, 62C, 930527, 84860
BFI WASTE CODE: MAY 05 1992

WASTE EVALUATION REQUEST

BFI to complete this area.

BFI Initiator: D Lawrence
Location: BFI Colonial Landfill
Company Number: 620 Date: 4/6/92
Telephone Number (504) 675-8021
Action Requested: ☒ New Waste Approval ☐ Up-Date Approval ☐ Priority ☐ Other

Previous Laboratory Number:
Disposal Method Requested: Burial
Disposal Site Requested: Colonial Landfill
Company Number: 620 P.O. Number: 620-0500Le
Analyses Requested: ☐ TCLP ☒ RCI ☐ Other
Analyses To Follow: ☐ TCLP ☐ Other

WASTE CHARACTERIZATION DATA

Special Waste

IMPORTANT: THIS FORM IS TO BE COMPLETED BY A REPRESENTATIVE OF THE WASTE GENERATOR. PLEASE READ THE INSTRUCTIONS BEFORE COMPLETING THIS FORM. THIS FORM IS TO BE USED ONLY ONE TIME, AND MUST BE TYPEWRITTEN OR LEGIBLY PRINTED IN INK, AND SIGNED.

1. GENERATOR INFORMATION

a) Generator's Name: Exxon Chemical Co BRPP
b) Generating Facility Address: 11675 Scotlandville Hwy
City: Baton Rouge State: LA Zip: 70807
c) Company Representative: Lee McNabb
Title: Environmental Specialist
d) Emergency Contact: Bob McBride
Title: Environmental Specialist

e) Local Registration No.:
Generator's EPA Id. No.: LAD000778381
f) Telephone No. (504) 778-5456
After Hours No. (504) 778-5281
Emergency No. (504) 778-5281

2. GENERAL WASTE STREAM INFORMATION

a) Description of The Waste: Waste water pond sludge / pond liner
b) Process Generating Waste: polyethylene production
c) Is this a treatment residue of a waste which was previously a restricted characteristically hazardous waste? ☐ Yes ☒ No
d) Is this a "Hazardous Waste" as defined by State or local Regulations? ☐ Yes ☒ No
If yes, enter the Waste Identification Number if one has been assigned:
e) *Is this a "Special Waste", an "Industrial Process Waste", or a "Polution Control Waste" as defined by State or local Regulations?*
☒ Yes ☐ No If yes, enter Waste Identification Number: #1788-365
f) Recommended personal protection equipment and special handling procedures: slicker suit, rubber gloves
g) Anticipated Volume: 200 ☐ Gallons ☐ Tons ☒ Cubic Yards ☐ Other
Per: ☐ Day ☐ Week ☐ Month ☒ Year ☐ One Time, or ☐ Other
To be transported in: ☒ Bulk ☐ Drums (type/size) ☐ Other
h) Is a representative sample included? ☒ Yes ☐ No – If yes, complete the RSC found on the reverse side.

3. WASTE PROPERTIES @ 72°F

a) Physical State:
☒ Solid ☐ Semi-solid ☐ Powder ☐ Liquid ☐ Combination
b) Odor:
Describe
☐ None ☐ Mild ☐ Strong
c) Flash Point, °F:
☐ ≤72 ☐ 73-100 ☐ 101-140 ☐ 141-200 ☐ ≥201 ☐ N/A ☒ N/D

d) Layers:
☒ Single Phase ☐ Bi-layered ☐ Multi-layered
e) Density Range: to
☒ N/D ☐ lbs./gal. ☐ g./cc. ☐ lbs./yd.³ ☐ Other
f) Color(s):
Describe Green - Brown - Black
g) pH:
☐ ≤2.0 ☐ 2.1-5.0 ☐ 5.1-9.0 ☐ 9.1-12.4 ☐ ≥12.5 ☐ N/A ☒ N/D

4. REACTIVITY

e) If the waste exhibits any of ☐ Water Reactive ☐ Alkaline Reactive ☐ Pyrophoric ☐ Thermally Sensitive ☐ Explosive ☐ Shock Sensitive ☒ None of the above

LA , 62C , 930537 , 84860

BFI WASTE CODE

5. THIS WASTE CONTAINS

Note if the waste contains any of the following:

☐ Free Liquids	☐ Dioxins	☐ Etiological Agents	☐ Radioactive Materials
☐ Free Cyanide	☐ Organic Solvents	☐ Pathogens	☐ PCBs not regulated by TSCA 40 CFR 761
☐ Free Sulfide	☐ Used Oils	☐ OSHA Substances	
☐ Free Ammonia	☐ Virgin Oils	☐ Biological Materials	☒ None of the above

If any of the above are checked "Yes", specify type (if applicable) and include its concentration as part of the waste composition, Section 6.

6. COMPLETE WASTE COMPOSITION

Concentration ranges are suggested, but total must equal 100%. Units must be identified and are to be in parts per million (ppm) and/or percentages (%). Attach additional pages if necessary.

Components	Range Min. / Max	Components	Range Min. / Max
Clay	75 - 94 %		
Sand	5 - 15 %		
Polyethylene	1 - 5 %		
Hypalon Liner	0 - 5 %		

7. TRANSPORTATION INFORMATION

If the waste is a DOT Hazardous Material, complete the following:

Proper USDOT Shipping Name: N/A

DOT Hazard Class: _____ UN or NA Number: _____ CERCLA Reportable Quantity: _____

8. SUPPLEMENTAL INFORMATION

☐ None ☐ MSD Sheets ☒ Analytical Data ☐ Memo/Letter ☐ Waste Composition

☐ Other - describe _____ No. of Pages _____

9. GENERATOR'S CERTIFICATION

I hereby certify that the above and attached description is complete and accurate to the best of my knowledge and ability to determine, that no deliberate or willful omissions of composition or properties exists, that all known or suspected hazards have been disclosed, and that the waste is not designated a Hazardous Waste by the USEPA or contains PCBs regulated by TSCA 40 CFR 761.

GENERATOR'S AUTHORIZED SIGNATORY:

DATE	PRINT NAME	SIGNATURE	TITLE	INITIALS
3/31/92	Lee McNabb	Lee McNabb	Env. Spec.	MEMc
3/12/93	Robert L. McBride	Robert L McBride	Environmental Specialist	RLM

REPRESENTATIVE SAMPLE CERTIFICATE

This Section is to be completed by the person obtaining the sample of the above described waste, preferably a representative of the generator. DO NOT COLLECT OR SUBMIT SAMPLES THAT ARE RADIOACTIVE, SHOCK SENSITIVE, EXPLOSIVE, OR PYROPHORIC.

I certify that the sample identified below that is being forwarded to BFI for evaluation is representative of the waste described above. I also understand that, should the waste material described herein not be acceptable for management by BFI Waste Systems, the sample(s) may be returned to the generator.

Collector's Name: Lee McNabb

Signature: Lee McNabb

Company: Exxon Plastics

Title: Env. Spec.

Telephone Number: (504) 778 5456

(Peel Off Label)

APPENDIX S

FACILITY OPERATIONAL PLAN

ExxonMobil Chemical Company

Baton Rouge Plastics Plant
Baton Rouge, Louisiana

GD-033-1788
AI No. 860

Facility Operational Plan
For Industrial Solid Waste Surface Impoundments

November 2006

Prepared By:

Eagle Environmental Services, Inc.
Post Office Box 87280
Baton Rouge, Louisiana 70879
(225) 757-0870

Eagle Project No. 13-0016

TABLE OF CONTENTS

1.0 INTRODUCTION

This Facility Operational Plan describes the operation of the Industrial Solid Waste Surface Impoundments at the ExxonMobil Chemical Company Baton Rouge Plastics Plant (BRPP). The industrial solid waste facilities operated by BRPP consist of three surface impoundments (South Stormwater Pond, North Stormwater Pond, and Equalization Pond) that are interrelated and provide for the containment and treatment of process water and stormwater runoff from the plant site. BRPP discharges all of its treated (gravity separation and/or neutralization) process water and contaminated stormwater by way of a permitted LPDES process wastewater outfall. Non-contaminated stormwater runoff is discharged to two stormwater outfalls.

The entire plant site is fenced to prevent unauthorized entry. Entrance is gained only through the BRPP Receptionist or through a Security Gate. The main gate is manned 24 hours a day. All visitors must check in at one of the entrances and are not allowed access to the process areas unless accompanied by an employee. To ensure safety and security at night, the main entrance, pump pads, and control areas are well lit. Lighting throughout the plant is sufficient for normal surveillance, discouraging vandalism, and discovery of spills.

The wastewater treatment ponds are located adjacent to the southern property line of BRPP. However, the property that adjoins that boundary of the plant site is developed as a tank farm and is owned by ExxonMobil Corporation. The wastewater treatment system is separated from adjacent property by a security fence.

BRPP has access to a fully equipped Fire Department from ExxonMobil Baton Rouge Chemical Plant and ExxonMobil Baton Rouge Refinery Plant.

2.0 TYPES OF WASTES GENERATED

The types of wastes in the Industrial Solid Waste Surface Impoundments are non-hazardous, on-site-generated wastes only. These wastes are sludges that accumulate in the three wastewater holding ponds, consisting of dirt, polymers, algae, and decayed organic matter. Entry of any other type of waste to the Industrial Solid Waste Surface Impoundments is forbidden and ensured by the normal process operations conducted at the plant and by the plant control measures detailed in response to LAC 33:VII.521.B.1.b of the Solid Waste Standard Permit Renewal Application for the Industrial Solid Waste Surface Impoundments.

2.1 Characteristics of Wastes

The wastes disposed in the Industrial Solid Waste Surface Impoundments are not characteristic or listed hazardous wastes as defined by LAC 33:V.Subpart 1 or by Federal regulations. This is confirmed by chemical analysis for toxicity characteristics leaching procedure (TCLP) or by process knowledge. Appendix R of the permit renewal application provides analytical data on the waste that is deposited in the Industrial Solid Waste Surface Impoundments.

The sources of wastes received by each pond are as follows:

North Stormwater Pond – Process wastewater and stormwater from the northern portion of the plant, and treated effluent from the oil/water (API) separator is routed to the North Pond prior to commingling with water from the South Pond. The North Pond can be isolated if necessary and the water pumped directly to the Final Effluent Basin.

South Stormwater Pond – Process wastewater and stormwater from the southern portion of the plant is routed to the South Pond, mixed with water from the North Pond, and pumped to the Equalization Pond. The South Pond can be isolated if necessary and the water pumped directly to the Final Effluent Basin. Polyethylene plastic which accumulates in this pond is skimmed off and recovered for sale as a by-product.

Equalization Pond – Wastewater from the South Pond and from the North Pond is pumped to the Equalization Pond. Water flows through an underflow/overflow weir system to trap any remaining plastic or oil for recovery by plant personnel. Water leaving the Equalization Pond flows to the Final Effluent Basin and thence to LPDES Outfall 001.

2.2 Quantities of Wastes

In 1992-93, BRPP's Wastewater Pond Liner Project resulted in 4,370 tons of wastewater pond sludge being sent off site for disposal. This was the amount of sludge buildup over a 10-year period. Based on this number, BRPP estimates that sludge buildup in the ponds is approximately 437 tons/year (8.4 tons/week).

3.0 WASTE-HANDLING PROCEDURES

3.1 Waste Route and Sequence

The sole function of the Industrial Solid Waste Surface Impoundments is to collect the wastewater described in Section 2.0 for treatment and reclamation of product prior to discharge. Recovered polyethylene is sold as product.

The North Stormwater Pond receives process wastewater and stormwater runoff from the northern half of the plant site, as well as treated effluent from the API separator. The South Stormwater Pond receives process wastewater and stormwater runoff from the southern half of the plant site.

Effluent from the North Pond flows into the South Pond, or it may be pumped directly to the Final Effluent Basin if necessary. Effluent from the South Pond flows into the Equalization Pond.

At the Equalization Pond, water flows through an underflow/overflow weir system to trap any remaining plastic or oil for recovery by plant personnel. Water leaving the Equalization Pond flows to the Final Effluent Basin and thence to LPDES Outfall 001.

Sludge generated in the ponds will remain in the ponds until such time as the storage capacity dictates removal, or the facility is closed.

3.2 Traffic Control

Traffic control is not applicable to the Industrial Solid Waste Surface Impoundments.

3.3 Support Facilities

Support facilities for the Industrial Solid Waste Surface Impoundments include the sewer system which directs the waters to the ponds, as well as the pumps that are used to route waters to and from the ponds.

3.4 Equipment Operation

No heavy equipment is required for managing the ponds. Continuous monitoring of flow, total organic carbon (TOC), and pH is conducted on the final discharge.

3.5 Personnel Involvement

BRPP's Environmental Department is responsible for maintaining all environmentally related administrative and management records necessary for the effective management of the Industrial Solid Waste Surface Impoundments and for preparing required reports.

The following personnel have key roles in operating the Industrial Solid Waste Surface Impoundments:

- Environmental Coordinator – Establishes and maintains plant environmental programs to ensure compliance with State and Federal regulations applicable to plant operations.

- Environmental Specialist – Maintains records, documentation, permits, etc., pertaining to environmental matters; provides supervision and training of BRPP and contract personnel in the proper management of solid wastes generated.

- Operations Supervisors – Provide supervision of mechanics and operators in a specified area of the plant. Usually former operators or mechanics who are

qualified at several different positions and have several years of plant experience are appointed to this position.

- Utilities Technician – Works within the manufacturing area and performs maintenance of the wastewater treatment system and this position, commonly known as the "J-7" is also responsible for performing the following functions as far as the management of the solid waste facilities are concerned: makes routine inspections of the surface impoundments and reports all incidents concerning the management of solid wastes to the First Line Supervisor. This position is worked by many different technicians, all of whom have had extensive training in the management of the solid waste facilities.

In addition to the above personnel, technical support is available from process and mechanical engineers who are assigned to those areas.

3.6 Administrative Procedures

Records pertaining to solid waste include the type and quantity of waste generated by all phases of the operation. Manifest records concerning industrial solid waste disposed off site, the name of the collector/transporter, and the name of the disposal facility are also kept on site. The records contain the information needed to prepare annual reports required by the Louisiana Solid Waste Regulations. Documentation of inspections, training programs, emergency plans, and closure plans related to the surface impoundments are kept on file by the environmental coordinator. All solid waste records are maintained on site and are available upon request for LDEQ inspection.

3.7 Quality Assurance/Quality Control (QA/QC)

Wastes entering the Industrial Solid Waste Surface Impoundments are non-hazardous, on-site-generated wastes only. Entry of any other type of waste is forbidden and ensured by the normal process operations conducted at the plant and by the control measures detailed in response to LAC 33:VII.521.B.1.b of the permit renewal application. Since only waters described in Section 2.0 are accepted for entry at the pond, a QA/QC plan covering pre-acceptance and delivery restrictions and analytical methodologies is not normally required.

QA/QC procedures for the impoundments are keyed to various sumps where waste streams are routed in an emergency situation. Spills are containerized and only "de minimis" quantities are washed down into the oily water sewer system where they are contained by the oil/water separator and not allowed to flow into the impoundments. All hazardous materials are contained in vessels or piping which insures that they will not be routed into the process sewer systems.

3.8 Provisions for Controlling Vectors, Dust, Litter, and Odors

The characteristics of the waste in the ponds are such that they do not become litter, generate dust, emanate odors, or attract pathogen-transmitting organisms; therefore, no provisions to control these events are necessary.

4.0 EQUIPMENT OPERATION AND FACILITY MAINTENANCE PROCEDURES

Machinery and appurtenances involved in operations at BRPP are periodically inspected and maintained to prevent breakdowns. Maintenance of the Industrial Solid Waste Surface Impoundments is performed routinely to sustain the operating efficiency and integrity of the facilities. Principally, these tasks include cleaning of the pond, when necessary, as well as inspections of all levees and monitoring equipment. Cleaning of the Industrial Solid Waste Surface Impoundments is conducted when the buildup of solids inhibits performance.

Inspection of facilities is conducted daily. Inspection is conducted to ensure that erosion of the levees does not occur and that the levees maintain their functions of containing the waste in the ponds and preventing potential run-on. Also, water levels in the ponds are checked to maintain adequate freeboard and ensure that overtopping is prevented.

General Housekeeping inspections are performed and include examining for the presence of odors and litter; if observed, the safest and most environmentally efficient means to remedy the situation is implemented. Excessive vegetative growth is removed when such growth prevents proper access, inspection, or operation, or when it may provide a conduit for groundwater contamination. Daily observations of the wastewater system and any possible deficiencies are documented in BRPP's "Shift Summaries."

In the event that a release of waste, including a leak in an impoundment, is discovered, BRPP will notify LDEQ in accordance with LAC 33:I.Subpart 2.

5.0 OTHER PROCEDURES

5.1 Procedures During Breakdowns and Abnormal Conditions

All machinery and appurtenances involved in plant operations, including the ponds, are periodically inspected and maintained to prevent breakdowns and ensure the containment of wastes. However, any breakdowns which result in the release of solid waste will be reported to LDEQ promptly. In the event of an emergency situation, normal operations of the Industrial Solid Waste Surface Impoundments will be shut down and wastewater discharges stopped during cleanup operations.

Operations at the plant continue as usual during most types of inclement weather. Severe weather conditions, such as hurricanes or other violent storms, may result in the closing of the plant, depending on the location, severity, and likelihood of direct

impact. Decisions to shut down the plant at these times are made by management personnel.

5.2 Procedures, Equipment, and Contingency Plans for Protection of Employees and the General Public from Accidents, Fires, Explosions, etc.

BRPP is surrounded by a perimeter fence to prevent unauthorized ingress into the operational areas of the site. All personnel entering the site are required to wear protective equipment, such as hard hats, safety glasses; long sleeves, and other PPE as necessary. In the unlikely event a major incident arises, including fires, spills, explosions, or injury, elements of BRPP's Emergency Procedures Manual will be activated. The plant is equipped with on-site emergency equipment and staff, including medical personnel. Outside services, such as, fire and rescue, police, ambulance, and medical, are available if necessary. BRPP requires all employees to undergo a rigorous safety training program as it relates to the overall safety requirements of the plant and the specific safety requirements dictated by the employees' job assignments. Employees who are responsible for the operations of the ponds are required to be knowledgeable of the safety requirements and to perform accordingly.

EXHIBIT 1

DAILY INSPECTION CHECKLIST

DAILY INSPECTION CHECKLIST

Per Louisiana Solid Waste Rules and Regulations, the Industrial Solid Waste Surface Impoundments must be inspected daily for sufficient freeboard, evidence of leaks, and condition of structural integrity.

Report necessary repairs to the Environmental Department.

DATE	BY	ADEQUATE FREEBOARD?	LEVEE CONDITION	COMMENTS

APPENDIX T

CLOSURE SCHEDULE AND ESTIMATED CLOSURE COST

ExxonMobil Chemical Company Baton Rouge Plastics Plant
Industrial Solid Waste Surface Impoundments

Closure Schedule

Drain wastewater from ponds	5 days
Construct diversion ditch	10 days
Remove sludge and sample bottom	35 days
Backfill ponds	20 days
Plug and abandon monitoring wells	5 days
Slope, seed, and fertilize area	10 days
Submit final report to LDEQ	5 days
Total Elapsed Days	**90 days**

OPERATION	CALCULATION	ESTIMATED COST*
Mobilization/Demobilization	Lump sum	$5,000
Dewater surface impoundments	Approx. 12,000,000 gallons, pumped at rate of 30,000 gph per pump, $650 per day per pump. Three pumps.	$11,700
Grade and slope areas, 2.5acres	$1,000 per acre x 2.5 acres	$2,500
Remove and dispose sludge from surface impoundments	4,370 tons @ $40/ton plus $20,000 trucking	$194,800
Remove and dispose liner from surface impoundments	6 tons @ $75/ton plus $500 trucking	$950
Sample and test clay beneath liner	1 per 5000 ft^2. 25 @ $650	$16,250
Fill dirt, purchase and placement.	Approx. 63,000 yd^3 at $8.00 per yd^3 ($5.00 per yd^3 material, $3.00 per yd^3 labor)	$504,000
Abandon GWM system	5 wells @ $1500/well plus $6,000	$13,500
Install topsoil	Approx. 2000 yd^3 at $6.50 per yd^3 ($3.25 per yd^3 material, $3.25 per yd^3 labor)	$13,000
Install ground cover	3 acres at $2,000 per acre	$6,000
Prepare Certification Package and oversee closure	$90,000 flat fee	$ 90,000
TOTAL		$857,700

APPENDIX U

CLOSURE PLAN

EXXONMOBIL CHEMICAL COMPANY
BATON ROUGE PLASTICS PLANT
BATON ROUGE, LOUISIANA

AGENCY INTEREST NO. 285
FACILITY ID NO.GD-033-1788

For Industrial Solid Waste Surface Impoundments
Facility Closure Plan

February 2007

Prepared By:

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Eagle Project No. 13-07-0108

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1.0 INTRODUCTION

This Closure Plan describes the procedures that will be employed to clean-close the industrial solid waste impoundments at Exxon/Mobil, Baton Rouge Plastics Plant (BRPP). These surface impoundments are the South Stormwater Pond, North Stormwater Pond and the Equalization Pond. The three impoundments collect the wastewater and stormwater runoff from the Plant for treatment and reclamation of product prior to discharge. Entry of any other type of waste is prohibited. The impoundments are designed and operated to control and contain rainfall resulting form a 24-hour, 25-year storm event.

It is anticipated that Plant operations will continue for the foreseeable future, and the life of the ponds is estimated to be at least 30 years, based on projected use. The estimated date of closure of all solid waste facilities is 2016, based on installation in 1986.

If the quantity of sludge generated in the Industrial Solid Waste Surface Impoundments interferes with the required operating depth and freeboard level, then the sludge will be excavated and disposed of off site in a permitted solid waste disposal facility. This measure will ensure that the impoundments will be able to operate for the entire 30-year life span.

2.0 PRE-CLOSURE REQUIREMENTS

At least 90 days prior to the initiation of closure procedures, Exxon/Mobil BRPP will notify the Louisiana Department of Environmental Quality (LDEQ) in writing of its intent to close the industrial solid waste impoundments. A formal written Closure Plan will be submitted to LDEQ at least 90 days prior to the initiation of the final closure for these impoundments. This notification will include the estimated date of closure, cost estimates, and written certification that the closure will be accomplished in accordance with the methods approved by LDEQ.

3.0 CLOSURE PROCEDURES

The only solid waste contained in the Industrial Solid Waste Surface Impoundments is soil from stormwater runoff, polyethylene plastics, and natural solids from biological degradation. At closure, all water will be routed through the Equalization Pond where the plastic will be removed. In addition to groundwater monitoring to detect contamination, additional measures will be taken to ensure that no solid waste remains on site after closure. These measures include the disposal of all sludge remaining in the ponds at an off-site permitted solid waste disposal facility and a thorough inspection of the liner prior to its disposal at a permitted landfill. The underlying soil will also be visually inspected for polyethylene pellets.

The following steps will be conducted at closure:

1) The ponds will be drained and wastewater discharged in accordance with the LPDES permit.

2) Stormwater runoff will be diverted away from the site during closure.

3) All non-recoverable solid waste in the pond will be disposed of off-site at a permitted disposal facility.

4) The liner will be removed and underlying clay sampled to ensure there is no contamination to the natural soil. The liner will also be disposed of at a permitted disposal facility.

5) Prior to backfilling and removal of the equipment used during the closure process, Exxon/Mobil BRPP will notify LDEQ that the closure requirements have been satisfied and a final inspection will be requested.

6) The pond will be backfilled with a clean suitable earthen material and the surface covered with topsoil, sloped to facilitate drainage, and seeded with grass to control erosion.

7) Associated wells will be plugged and abandoned.

8) Submittal of final results to LDEQ for approval.

As described above, the ponds will be clean-closed and backfilled with clean fill or other suitable earthen material to natural grade and the whole area seeded or covered with rock, in accordance with the approved standard procedure. The area of the surface impoundments will be restored to their original condition; therefore, the requirement for a drawing showing final contours is not applicable.

Surface areas of each pond is as follows:

South Pond	43,900 sq. ft.
North Pond	36,650 sq. ft.
Equalization Pond	10,500 sq. ft.

All three ponds were drained, cleaned, and relined in 1992. At that time approximately 4,370 tons of sludge was removed and disposed of at a permitted solid waste landfill. It is expected that a similar amount may be generated over the remaining life of the facility.

The Neutralization Basin, a fourth surface impoundment at Exxon BRPP, was clean-closed in the fourth quarter of 1993. A Closure Plan was submitted to DEQ in February 1993 (Solid Waste Permit Modification #5). MW-17, a downgradient monitoring well for the basin, was abandoned and plugged at this time, in accordance with LDEQ and DOTD procedures.

Since all solid waste will be removed from the ponds at closure the requirement to

file a notice in the mortgage and convenience records of East Baton Rouge Parish is not required.

3.1 Long Term Use

Following closure of the ponds, the site will be suitable for future industrial expansion. Exxon BRPP will maintain ownership of the property. Exxon BRPP will also determine the ultimate use of the closed area, and any preliminary plans for future use of the site will be submitted to LDEQ.

The Industrial Solid Waste Surface Impoundments will be clean-closed; therefore, post-closure groundwater monitoring will not be required.

Exxon BRPP will maintain ownership of the land and continue operations throughout the post-closure period. The land will remain fenced and guarded to prevent unauthorized entry. All safety measures employed during the operation of the ponds, as well as inspections and maintenance of the final cover, will continue during this time.

This property may be covered with grass or rock and may not be used in any manner, or it may be used for future process expansion. The actual use will be decided by Exxon BRPP at the time of closure with approval from LDEQ.

4.0 CLOSURE SCHEDULE AND THE ESTIMATED COSTS

4.1 Closure Schedule

Drain wastewater from ponds	5 days
Construct diversion ditch	10 days
Remove sludge and sample bottom	35 days
Backfill ponds	20 days
Plug and abandon monitoring wells	5 days
Slope, seed, and fertilize area	10 days
Submit final report to LDEQ	5 days
Total Elapsed Days	**90 days**

4.2 Closure Cost Estimate

Exxon/Mobil BRPP estimates that the cost of closing the North Stormwater Pond, the South Stormwater Pond and the Equalization Pond will be $857,700. This cost is based on the cost of hiring a third party to close the impoundments at the point in the facility's operating life when the extent of their operation would make closure the most expensive. The closure cost estimate will be updated annually or as required by the regulations.

4.3 Calculations

OPERATION	CALCULATION	ESTIMATED COST*
Mobilization/Demobilization	Lump sum	$5,000
Dewater surface impoundments	Approx. 12,000,000 gallons, pumped at rate of 30,000 gph per pump, $650 per day per pump. Three pumps.	$11,700
Grade and slope areas, 2.5acres	$1,000 per acre x 2.5 acres	$2,500
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Install ground cover	3 acres at $2,000 per acre	$6,000
Prepare Certification Package and oversee closure	$90,000 flat fee	$ 90,000
TOTAL		$857,700

APPENDIX V

EXXONMOBIL CORPORATION ANNUAL REPORT